TECHNOLOGY DEPT.

TECHNOLOGY REVIEW

July 1954

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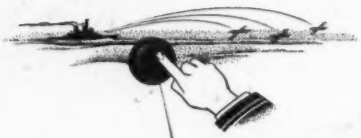
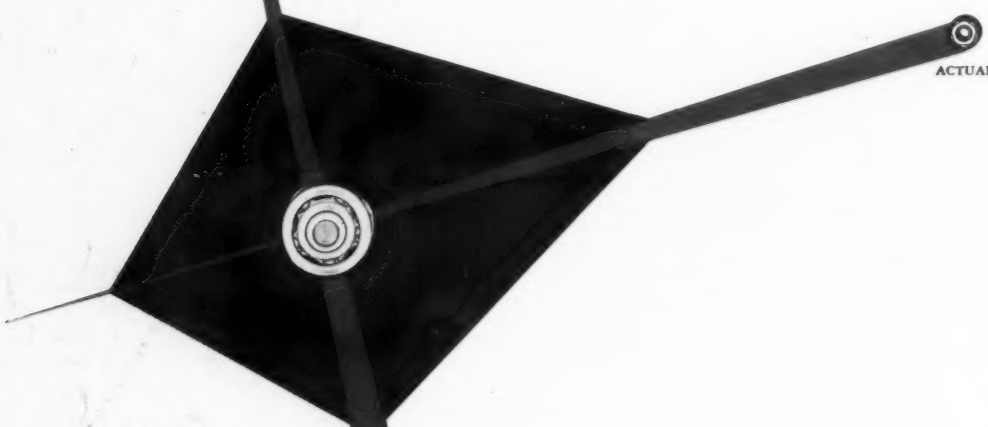
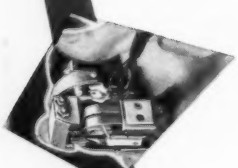


HERE'S HOW KETAY FIRE CONTROL RELAYS keep naval guns "ON TARGET" ...with MPB bearings



ACTUAL SIZE MPB 3C

accurate concentricity of miniature bearing roller guides increases relay sensitivity and dependability



...control relay designed and manufactured by Ketay Manufacturing Corporation of ... York.

OPERATING CONDITIONS — maximum sensitivity and consistency of response depend on free-rolling, concentrically accurate bearings . . . bearings serve as rollers and guides for rotating armature shaft which is displaced right and left to close desired circuits . . . unit actuated by 3 to 40 volts. CRITICAL — low-friction bearing rotation . . . ability to withstand 2,000 ft.-lbs. shock (equal to recoil of 16 in. naval guns), plus temperature changes from −55° C to +71° C . . . long wear and attention-free bearing operation. RESOLVED — by use of MPB No. 3C, radial retainer bearing.

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LUMMUS COKING UNITS
give top performance for
Pan-Am Southern

Lummus has built two delayed coking units for Pan-Am Southern Corporation in the past few years, one at El Dorado, Arkansas, and the other at Destrehan, Lousiana... and Pan-Am Southern is well satisfied with them.

The El Dorado unit, despite a 42 day steel strike during the construction period, was completed ahead of the specified date, and for less than the guaranteed maximum cost. It was designed to charge 9,300 B/D of reduced crudes, but since coming on-stream, the daily rate has averaged 10% above the designed capacity. The unit went on-stream immediately and operated 181 out of the first 199 days after completion (a 91% service factor). In the first half of 1953, it achieved and has since averaged a 97% service factor (224 day run, 6 day down-time). On-stream maintenance and repair costs are correspondingly low.

Gas oil from the coker (53% yield of reduced crude charge) is used for catalytic cracking charge stock where its low Conradson carbon allows it to be processed without penalty. Yield structure compares favorably with that obtained from catalytic cracking of virgin gas oil. The coke produced in the process is of sufficiently high quality for use in the manufacture of electrodes for aluminum production.

The new (and similar) Destrehan installation is achieving equally satisfactory records.

Lummus engineers have done an outstanding job for Pan-Am Southern. Why not consult with Lummus on *your* next coking project?

THE LUMMUS COMPANY, 385 Madison Avenue, New York 17, New York. *Engineering and Sales Offices:* New York, Houston, Montreal, London, Paris. *Sales Offices:* Chicago, Caracas. *Heat Exchanger Plant:* Honesdale, Pa. *Fabricated Piping Plant:* East Chicago, Indiana.

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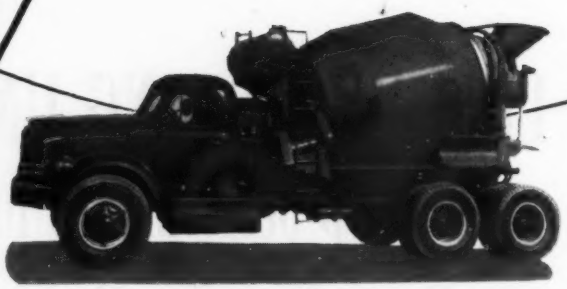

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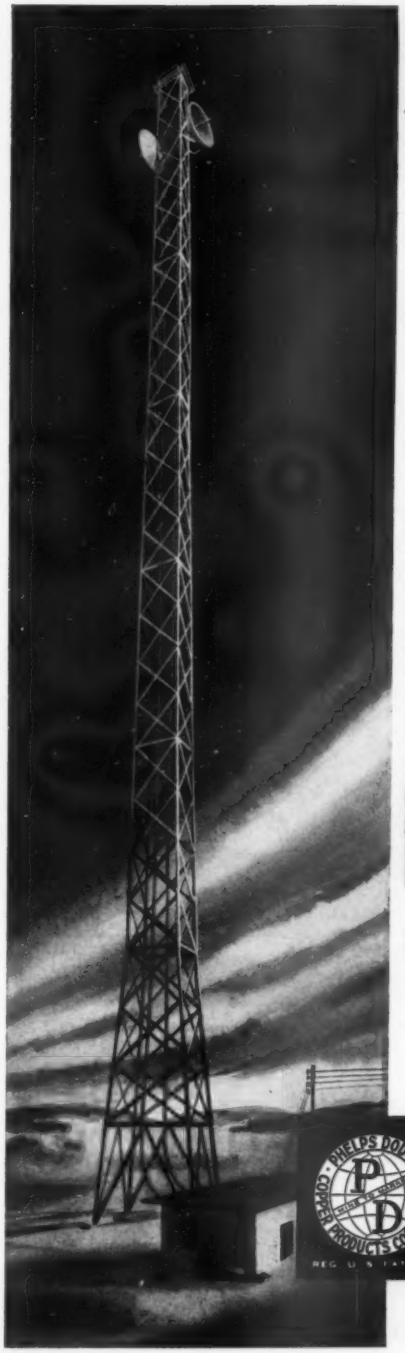
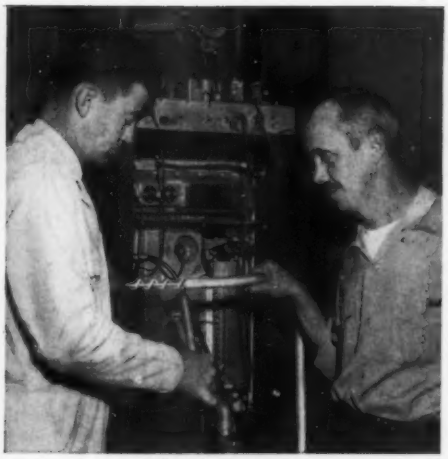
has many applications in the communication field!





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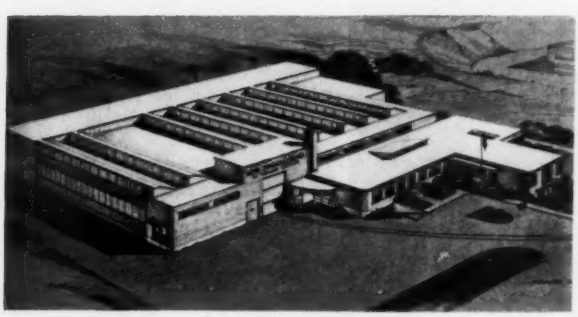
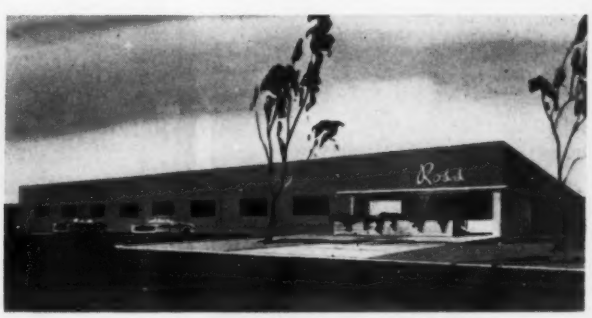
The ROSS plant and laboratory at New Brunswick, N. J., built in 1952.

so long a leader and still *Growing!*

Year after year since 1921 the business of J. O. Ross Engineering Corporation has been called upon to serve a steadily widening field for its products and services. One after another new ROSS manufacturing plants have had to be built and new ROSS branch offices opened to keep apace with the increasing volume of orders for ROSS AIR SYSTEMS throughout the world. Our fourth new plant is now under construction—our eleventh branch office already opened. Still Growing!



Fine modern ROSS plant located near Montreal, Canada.



Newest ROSS plant now being completed at Los Angeles, Calif.

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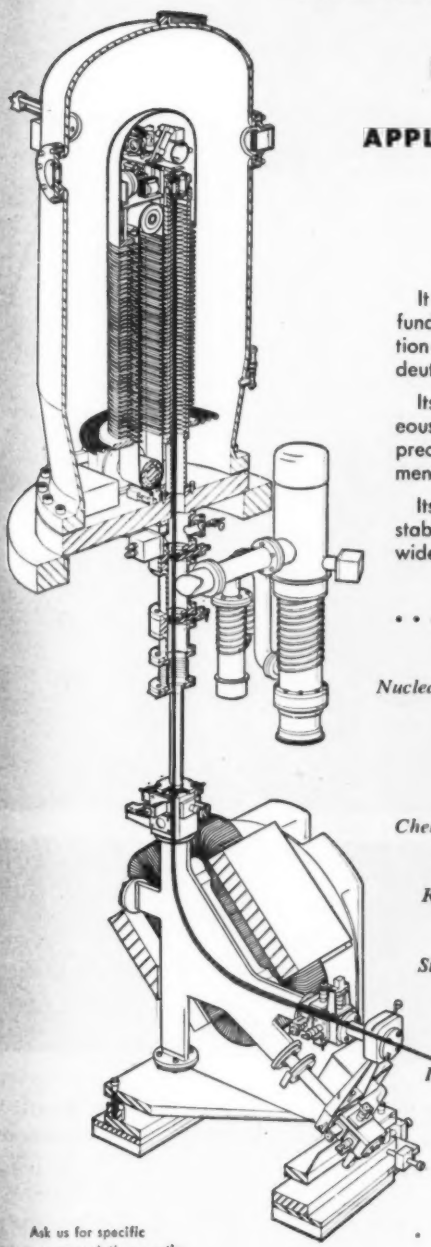

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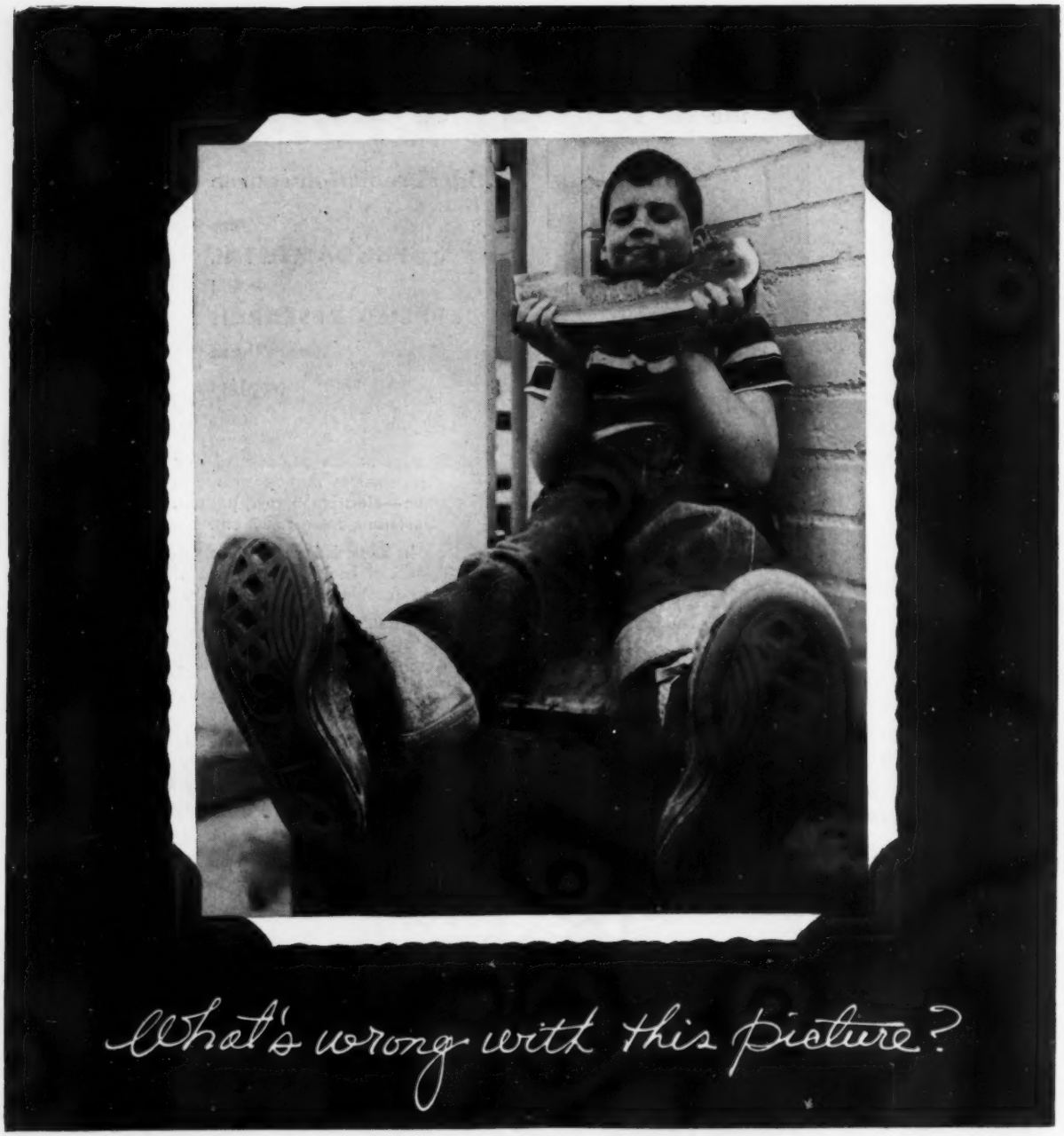

You probably have a snapshot like it in your own photograph album.

It happens when you get too close to your subject, and the camera can't handle the perspective.

In another sense, you can get an equally distorted picture of the modern corporation. For viewed too close-up, it frequently looks bigger than it is.

Take Union Oil. In 1910—when we did but a $12,000,000 volume—we seemed much smaller. *Yet at the time this was 23% of the total petroleum business in the western states.*

In 1953 we looked much bigger because we did a whopping $325,000,000 volume. *But this was only 13% of the petroleum business in the West.*

Certainly we've grown. We've *had* to grow to serve a bigger market, to meet increased competition and to satisfy more consumer needs. *But in proportion to the total business, we aren't as big as we were 44 years ago.*

Seen in perspective, the picture is clear: Union Oil, like so many so-called "big" companies, is really getting smaller all the time!

UNION OIL 76 COMPANY
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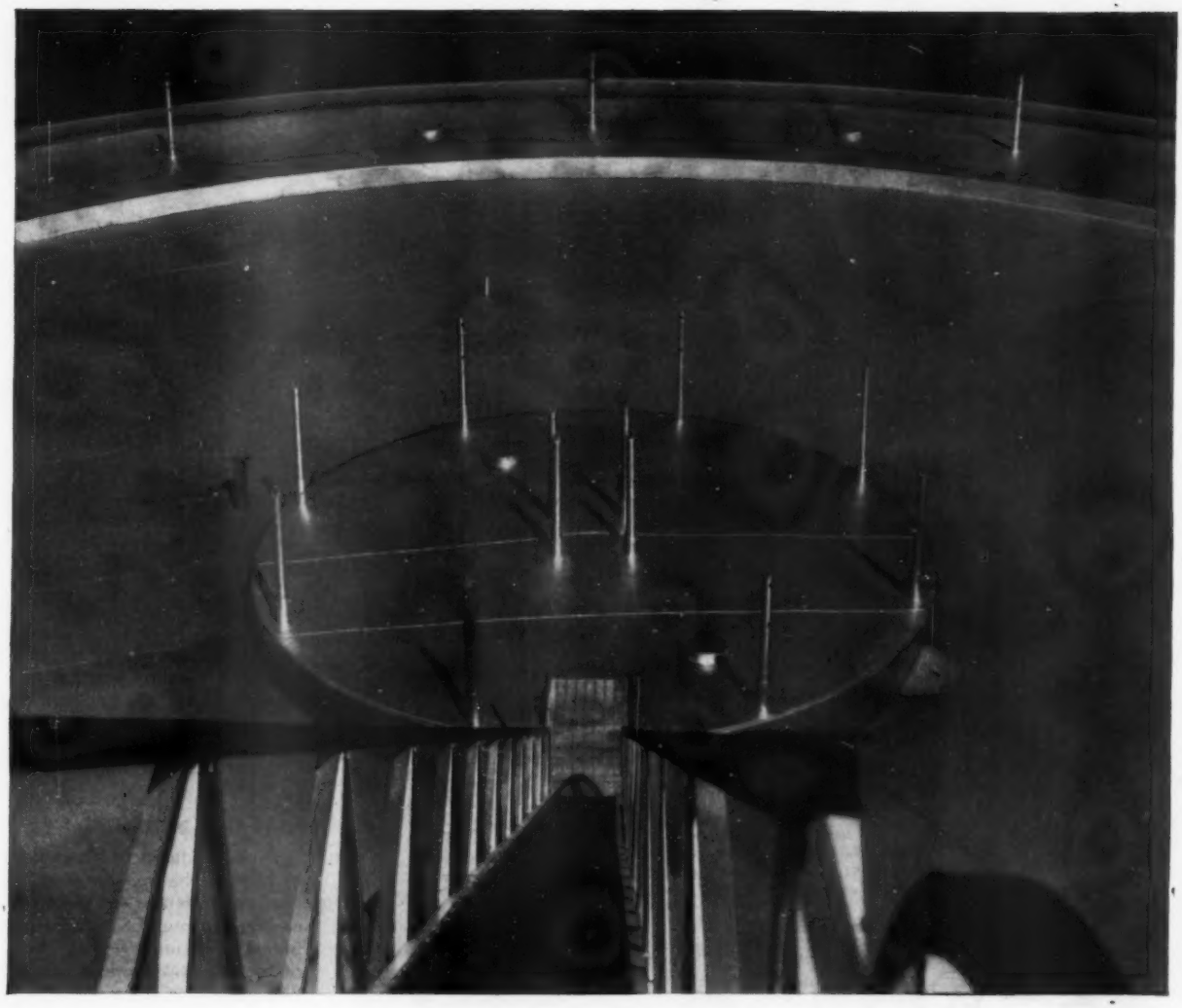
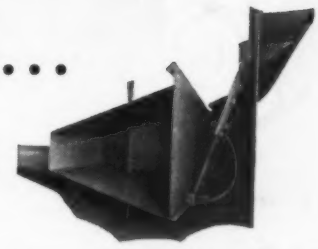


You are looking down...

into a Graver Center-Weighted "Floater." It's a well-built tank especially designed to conserve volatile vapors by means of Graver's own "Vapor-Stop" Seal—the improved seal which maintains firm closure between the floating roof and the shell.

This patented Graver seal mechanism is an integral part of all Graver Floating Roof designs. It is flexible, yet firm—tight, yet responsive. It provides centering action for the roof and prevents the entrance of air and rain.

From time to time you may expect similar technological improvements from Graver...where increasing emphasis will continue to be placed on research and development.



Graver's "Vapor-Stop" Seal!

The seal is free and limber, yet continues to close the gap and prevent loss of vapors. It is successful on both converted tank shells and new construction.

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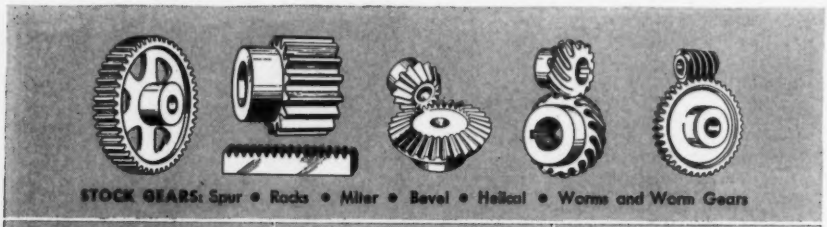

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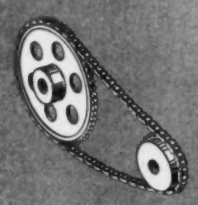

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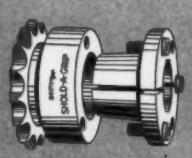
For drives ranging from fractional to 40 hp



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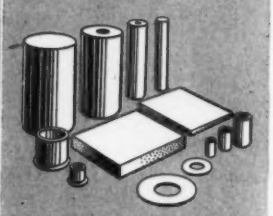

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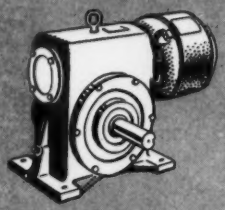
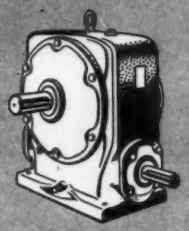
oil-impregnated
BEARINGS



RATIOMOTORS
Motorized Speed Reducers
32 types—1/20 hp to 3 hp



REDUCTORS
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.005 hp to 36 hp

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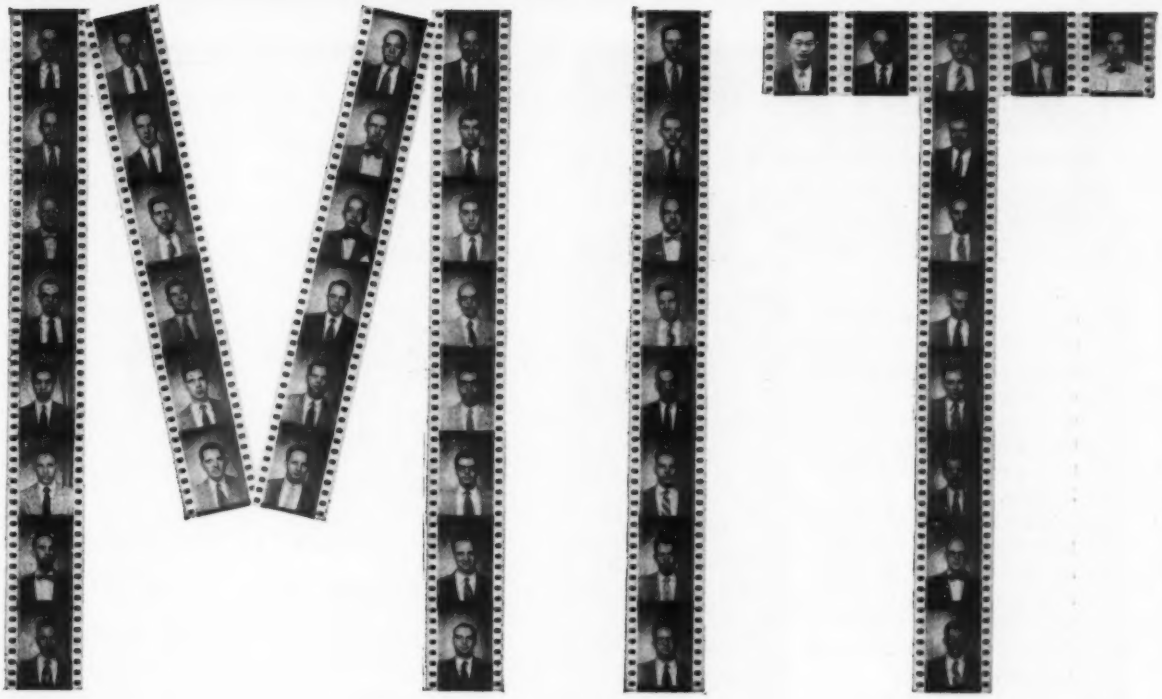

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5 Sheung S. Chin '46
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48 W. B. Bergen '37

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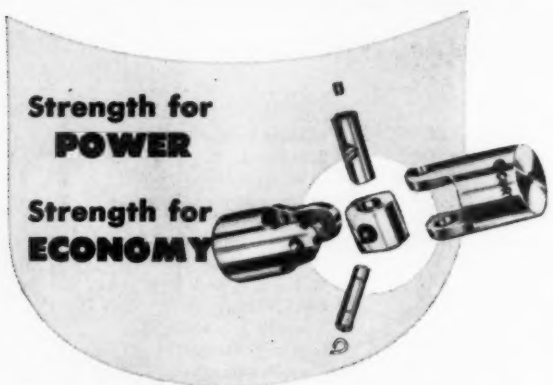

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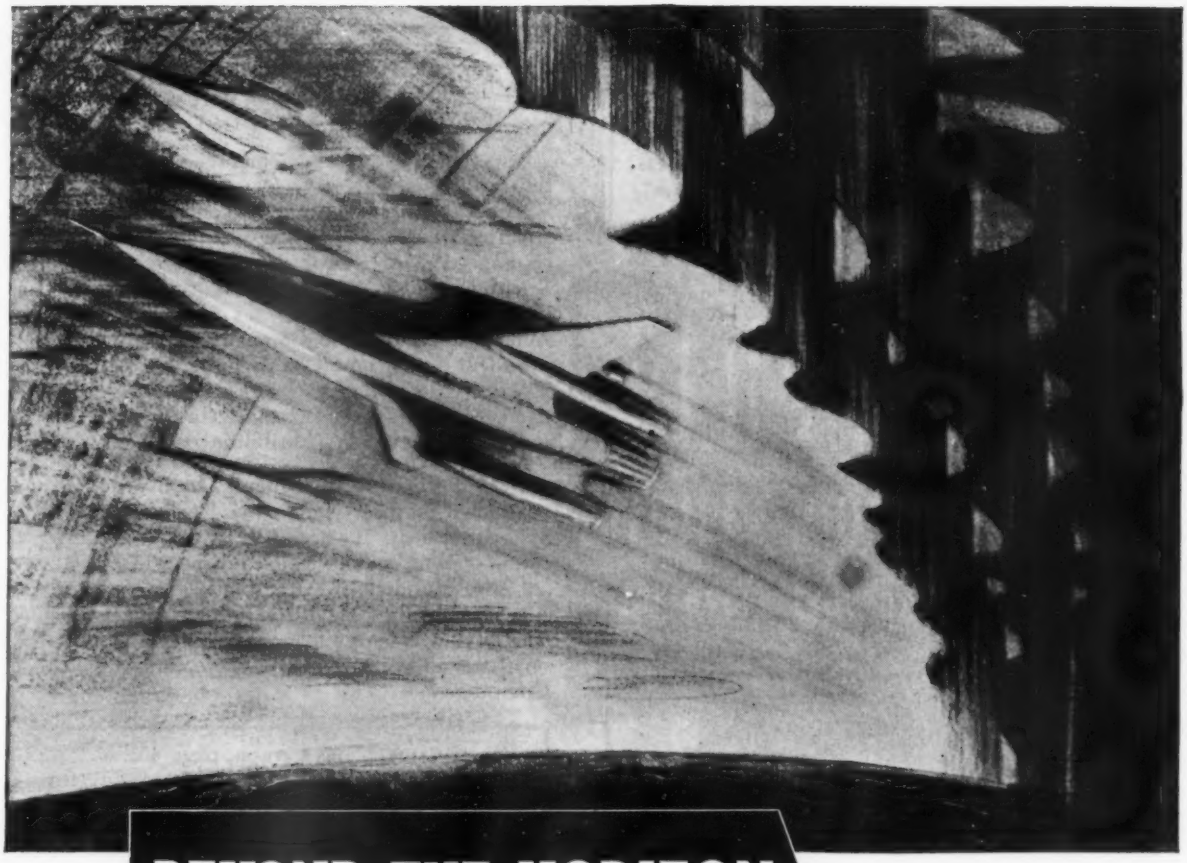
THE TABULAR VIEW

Tribute. — This issue of The Review, the last number of Volume 56, was fully planned and well into production when the world learned of the untimely death of Karl Taylor Compton, ninth president of the Massachusetts Institute of Technology. Except for two items, this issue reaches its readers as originally planned as, no doubt, Dr. Compton would have wished. One change is the addition of the four-page form comprising pages 452 to 455, inclusive; the other is the tribute on page 458. DAGMAR, author of the epode to Dr. Compton (page 458) is a professional writer whose articles and essays in the field of cultural history, have appeared for many years in magazines and newspapers throughout the country.

The Educated Man. — The 922 who received degrees from Technology this June, and 4,000 members of their families gathered in the Rockwell Cage on June 11, heard inspiring words of advice from CLARENCE B. RANDALL who delivered the Commencement Address. Former president and now Chairman of the Board of the Inland Steel Company, Dr. Randall reminded the graduates of the need to continue their education throughout their entire life. In his address entitled, "The Educated Man," which The Review is pleased to bring to its readers (page 461), Dr. Randall spoke eloquently of the obligations of educated persons to serve their community and the nation, intelligently and unselfishly. Born in Newark Valley in 1891, Dr. Randall attended Harvard University where he received the A.B. degree in 1912 and the LL. B. degree in 1915. For the next two years he practiced law in Ishpeming, Mich., served in France during World War I as captain, and resumed his law practice between 1919 and 1925. In 1925 Dr. Randall joined the Inland Steel Company as assistant vice-president, and rose to top position in that firm in the past quarter century. He is recipient of nine honorary doctorates, is active in many civic and philanthropic organizations, has been honored with numerous awards, and is author of several books and many magazine articles.

Our Greatest Resource. — Speaking at the open air luncheon on Alumni Day, RICHARD L. BOWDITCH, '23, reminded his listeners that the American way of life imposes obligations in addition to offering advantages of freedom. Under the title, "Our Greatest Resource" Mr. Bowditch recalled that personal liberty depends upon respect for truth and decency, and makes demands of personal sacrifice upon all of us. The Review is happy to publish this very able address (page 463) as part of the major addresses of Alumni Day. Mr. Bowditch, who has just completed his term as President of the United States Chamber of Commerce, brings to his address, deep and sympathetic understanding of the nation's educational needs in its task of ably administering to the youth of America — our greatest resource.

(*Concluded on page 440*)



BEYOND THE HORIZON....

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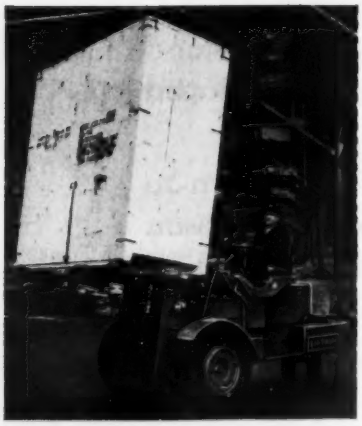

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THE TABULAR VIEW

(*Concluded from page 438*)

The Engineer in Management. – An assessment of the qualities of engineers as managers was given by WILLIAM B. GIVEN, '08 who was chosen to deliver the Alumni Day Banquet address, which is reproduced on page 465. Mr. Given was educated at Sheffield Scientific School, Yale University, as well as at M.I.T. His entire business career has been spent with the American Brake Shoe Company, of which he was president and is now Chairman of the Board. He is especially noted for his progressive concepts of management, and for his encouragement of people to reach out for new responsibilities.

Next 10 Years. – The Alumni Day Symposium was conducted by three well-known Technology Alumni; Vannevar Bush, '16, President of the Carnegie Institution of Washington; Admiral Edward L. Cochrane, '20, Vice-president of M.I.T., and Dean E. P. Brooks, '17, Head of the School for Industrial Management. The Review is happy to publish (page 467) its report on these addresses, as well as remarks by Karl T. Compton.

Contents page photograph, page 451 of this issue, shows the stone bridge across Muddy River, and leading from Boylston Street into the Fenway.

The Review is not published during the summer months following July. This issue, therefore, concludes Volume 56. Number 1 of Volume 57 will be published on October 27 and dated November. Readers who bind their copies are reminded that if they possess nine issues of Volume 56, their files are complete. An index to the volume will be ready on September 15 and will be supplied post free upon request.

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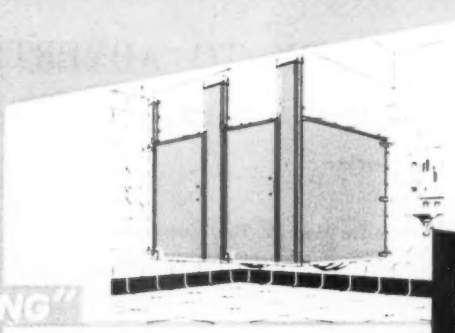

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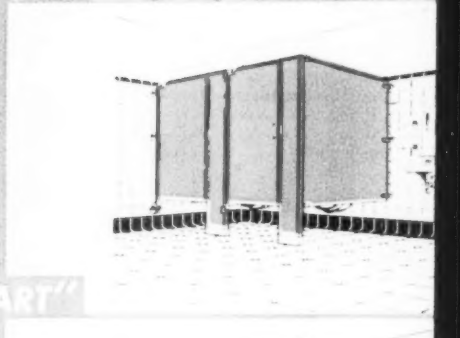

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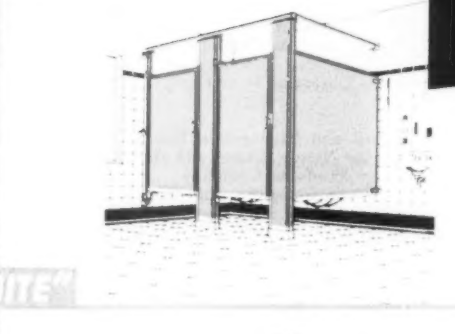

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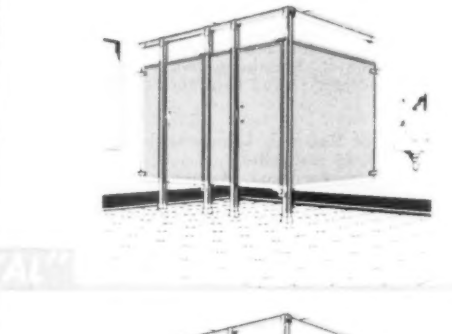

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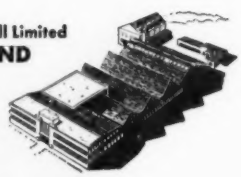

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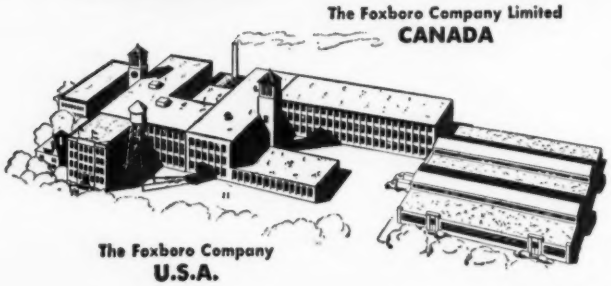

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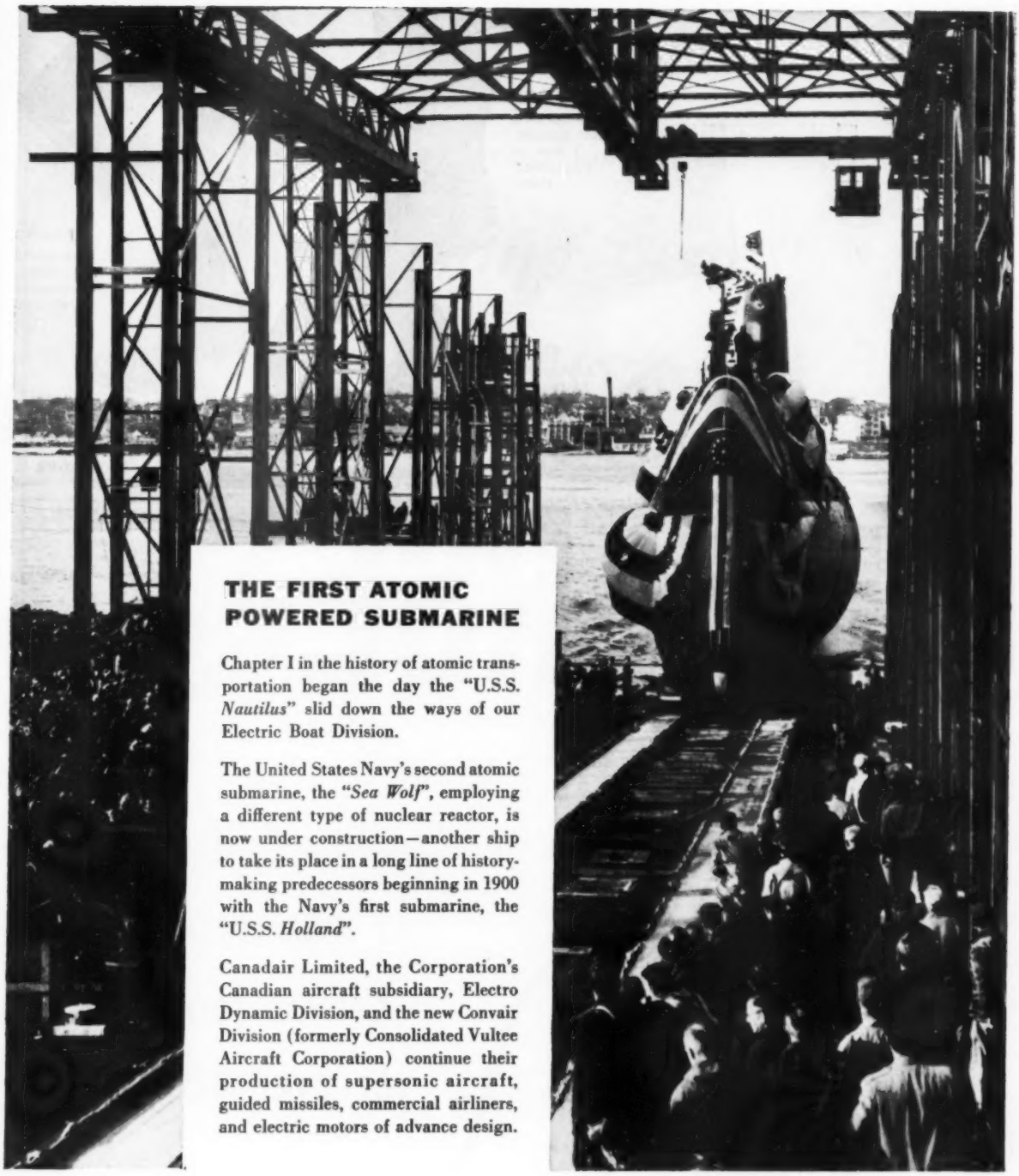

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GOODYEAR

The solidly built stone structure used as the contents page illustration in the June issue of The Review is the officers' and service mens' house in Boston Common, near Tremont and Boylston Streets.

Raymond E. Hanson

How Well Do You Know Boston?

Many an Alumnus must have visited this spot on a spring or summer afternoon. Can you identify this recreational area? If not, see page 440.

THE TECHNOLOGY REVIEW

TITLE REGISTERED, U. S. PATENT OFFICE

EDITED AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY

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Karl T. Compton

A great and gifted leader in science, education and public life, Karl Compton was also the most unselfish and princely man I have ever known. Through leadership in many areas of public affairs and through statesmanship that he showed in putting science to work for the welfare of the nation, he made a lasting contribution to American life. We who have known him as President of M.I.T., know that he was one of its greatest presidents and more than any man responsible for the institution which we know today.

— James R. Killian, Jr.

Karl Taylor Compton

September 14, 1887
Wooster, Ohio

June 22, 1954
New York, N. Y.

In the passing of Karl Taylor Compton, who died suddenly in the Cornell Medical Center in New York on June 22, the Massachusetts Institute of Technology has lost an outstanding physicist, educator, administrator, and humanitarian; Technology Alumni, students, Faculty, and Staff have lost a highly respected and most beloved friend; and the nation has lost one of its most able, patriotic, and public-spirited citizens.

In his customary gracious manner, Dr. Compton took his usual active and leading role in the events of the Institute's 88th commencement exercises on June 11, the reunion of the Class of 1929 on June 12, the dinner with Honorary Secretaries on June 13, and the activities of Alumni Day on June 14, as the following pages of this issue of The Review amply testify. Those who listened to his words of hope and encouragement suspected no trace of impending misfortune; they saw only the bouyant spirit, the noble simplicity, the disarming smile, and the friendly co-operation that has always characterized Dr. Compton. Following Alumni Day, Dr. Compton made a visit to New York where, on June 16, he was stricken with a heart attack and died five days later.

It is difficult to realize that Dr. Compton's gracious smile will no longer be seen in our midst. He represented everything for which the Massachusetts Institute of Technology stands; in fact, for many of us, he *was* M.I.T. The many tributes that have been paid his memory add naught to his many outstanding achievements, but of the love and respect which he commanded in all corners of the world, they speak volumes.

Funeral rites were conducted privately, but for the many who wished to pay final tribute to Dr. Compton, a memorial service was held on June 25* in the Great Court, where, on June 6, 1930, Karl Taylor Compton was inaugurated as the ninth president of Technology. Earlier in the morning of June 25, Dr. Compton's family, accompanied by Dr. and Mrs. James R. Killian, Jr., attended a private service in the Chapel of Mount Vernon Church. Following that service, which was conducted by Dr. Karl Heath Kopf, formerly minister of Mount Vernon Church, members of the family returned to M.I.T. where, in their presence, Dr. Compton's ashes were scattered in the Great Court.

At 11 A.M. simple and impressive memorial services were conducted in the Great Court within view of the office where, for nearly a quarter of a century, Dr. Compton served as beloved leader of the Institute. The service was attended by hundreds of Technology Alumni, as well as by students and members of the Faculty and Staff of the Institute. Also in the congregation were leaders in science and education, representatives of business and industry, of state and national governments, and of the many learned societies of which Dr. Compton had been a member. Among those who occupied the section reserved for honorary attendants were members of the Institute Corporation, the Administrative and Faculty Councils as well as employees who have served at M.I.T. for more than 25 years. More than 25 graduate and undergraduate students served as honorary ushers.

Arthur Fiedler conducted 40 members of the string section of the Boston Symphony Orchestra during the services which opened with Bach's "Jesu Joy of Man's Desiring," followed by Handel's "Aria from Concerto Grosso, Opus 6, No. 12." Dr. Theodore Parker Ferris, Pastor of Trinity Church, a member of the M.I.T. Corporation, and for many years a personal friend of Dr. Compton, read from the Scriptures, and the reading was followed by Bach's "Adagio." Then, in warm, simple, heartfelt terms, Dr. Ferris spoke of Dr. Compton's many fine qualities, and the rare manner in which Dr. Compton was able to combine religious faith and scientific knowledge. Said Dr. Ferris, "As a physicist, educator, administrator and servant of the nation, no man has made a larger or better contribution to the progress of modern science than he. And all this without losing the human values which alone make the scientific understanding of life worthwhile."

Finally, with the congregation standing, Mr. Fiedler conducted Bach's "Chorale from St. Matthew Passion." Following the final prayer, as the American flag in the Great Court was raised momentarily (to the masthead) and then slowly lowered to half-staff, a single trumpet sounded "Taps."

Of the many eulogies and tributes which were made upon the announcement of Dr. Compton's death, one of the first was made on the evening of June 23, in a broadcast from WGBH, the station of the Lowell Institute Co-operative Broadcasting Council which Dr. Compton helped bring into being early in 1947. Ralph Lowell, trustee of the Lowell Institute and a member of the M.I.T. Corporation spoke briefly but with great understanding of the work Dr. Compton had carried on. President Killian then broadcast the following tribute:

It would be impossible for me to speak of Karl Taylor Compton in the cold language of a factual biographical sketch. I worked for him and with him for nearly a quarter of a century and because of the generous opportunities which he gave to me, I came to know his ways, his mind, and his luminous personality. The response of his friends, his associates, and even those casually acquainted with him, to Karl Compton's personality was invariably one of spontaneous pleasure in a personality completely free of guile, sensitive in perception, emanating goodness and

* Nearly all of the student body and a large portion of the Faculty had already left Cambridge at the end of the school year. A memorial service for this group will be held after resumption of classes in the Fall.

wisdom, and always generous and benevolent in human relations. The comments that men made about him reveal the characteristic response of people to his brilliance, his charm and his humanity. One person would say that Karl Compton was the most princely man he had ever known, another that he was unselfish almost to a fault, another that he was kind and courteous to "the small people." Others expressed amazement at how indefatigable he seemed to be; others remarked how he personified simplicity in its finest sense, and what an extraordinary capacity he had to achieve teamwork among his associates and to make it seem little and unnecessary for people to indulge in bickering or trivial differences. In a way which he himself was probably unaware, he had a wondrous gift for calling forth the best in other people and for engendering a spirit of good will among all coming within his influence.

Aside from these great qualities of his as a superlative human being, Karl Compton's achievements fall mainly in three categories – his work as a scientist, as an educator, and as public servant. Let me say a brief word about each of these.

As a physicist, he published a long series of papers which represent brilliant contributions to many aspects of physics. His achievements in research as well as a teacher led him into many posts representing the great esteem felt for him by fellow scientists. Before becoming President of M.I.T., he was head of the Department of Physics at Princeton, he had been head of the American Physical Society, and he was the creator of the American Institute of Physics. He came to be a spokesman for science and scientists and lived to see many of his ideas come to happy fruition, particularly his advocacy of putting science to work for the defense and welfare of the nation.

As an educator, he first gained fame as a skilled teacher. His accomplishments in classroom and laboratory are still something of a legend at institutions such as Reed College in Oregon, where he obtained his first full-time teaching post, and later at Princeton. He had the capacity to set young men's minds on fire, and a great stream of men who worked under him as graduate students have distinguished themselves in American science. As President of M.I.T. he showed great capacity as an educational administrator; and under his presidency M.I.T., which had been a well-known school of engineering, when he took over, became a great institute of technology. He added to its program a flourishing school of science, a greatly extended graduate program and a humane and liberal spirit. In the annals of M.I.T. I think it clear that he will stand as one of its greatest presidents, one who brought new breadth and new depth to the teaching of science, engineering, management, and other fields. Few educational administrators who have made great advances in institutional development have ever accomplished so much with so little friction and so much enthusiasm as he.

His record as a public servant is too extensive to be detailed here, but always he was motivated by a deep conviction that a man has an obligation to serve his country without expectation of personal gain. Before the War, as chairman of a science board appointed by the President, he made a notable contribution by calling attention to opportunities whereby science can serve government and lead to the betterment of our economy and our health. With great success he carried into application the slogan "put science to work." During the War, as a member of the National Defense Research Committee, he joined a group of brilliant men, including Vannevar Bush and James B. Conant, in directing a military research program unparalleled in scope and in achievement. His specific responsibility was the famous Division 14 of the Office of Scientific Research and Development, which had the responsibility for our American radar development, but his counsel and his administrative direction made themselves felt in many other fields. So great was his contribution that his Medal of Merit citation included the extraordinary statement that he personally was responsible for shortening the duration of the War. During the early stages of the War, he was a member of the famous Baruch Committee that brought order out of our chaotic rubber situation and devised a program which was of fundamental importance in our winning the War. After World War II, he was chairman of the evaluation committee which reported on the first atomic test in the Pacific, and just before the end of the War he had gone to the Philippines to direct the Office of Field Service of the O.S.R.D. to assist our military operations in the far Pacific. When Japan surrendered, he was one of the first civilians to reach Japan and he led there a survey of the status of Japanese military science. Later, in 1948, he was called to succeed Vannevar Bush as Chairman of the Research and Development Board of the National Defense Establishment. Recently he had been asked by the Governors of the New England States to study the possibilities of developing and applying the fruits of atomic energy in New England.

Along with all of these manifold duties, he served numerous foundations and other institutions as trustee and director, including the Ford Foundation, the Rockefeller, and Sloan Foundations, and the Sloan-Kettering Institute. He also was a director of many companies which sought his services as a representative of the public.

However great these many contributions were, I think they all were secondary to his influence as a human being and to the nobility which characterized every aspect of his career and his day-to-day living. He was one of the finest products of our American civilization and one whose contributions to this civilization can give us hope about our future.

In his death much is lost but much abides. His life "a little holding lent to do a mighty labor," has made this country a greater and nobler place for all of us.

Instead of despair, we can hope for progress; instead of ugliness and evil, we can hope for more comeliness and virtue; instead of the darkness of ignorance, we can hope for new enlightenment. All of this was implicit in Karl Compton's achievements and in his influence.

The last photograph depicting Dr. Compton in an official act on behalf of the Institute shows him graciously accepting the gift of the Class of 1929 at the Alumni Day banquet on June 14. Gift presentation is being made by C. Brigham Allen, '29, as Horatio L. Bond, '23, and Vannevar Bush, '16. look on.

To the world at large, Dr. Compton will probably be remembered most as a distinguished scientist, as president of M.I.T. from 1930 to 1949, and thereafter as Chairman of the Corporation, and for the many services which he rendered to the nation. The responsibilities which he carried, and the services he rendered in any single one of these capacities, would have been sufficient for any ordinary man. But Dr. Compton carried on all of them graciously and with unusual effectiveness. He was able to enjoy few leisure hours as a private citizen, for his life was dedicated to the nation and to the Institute.

Yet it will be for his human qualities that those who were privileged to know him personally will remember him best. He could be – and was – at home with persons in all stations and ranks in life, and he was quick to recognize and praise the virtues he saw in others. Perhaps it was this quality, more than any other, which endeared Dr. Compton to his associates.

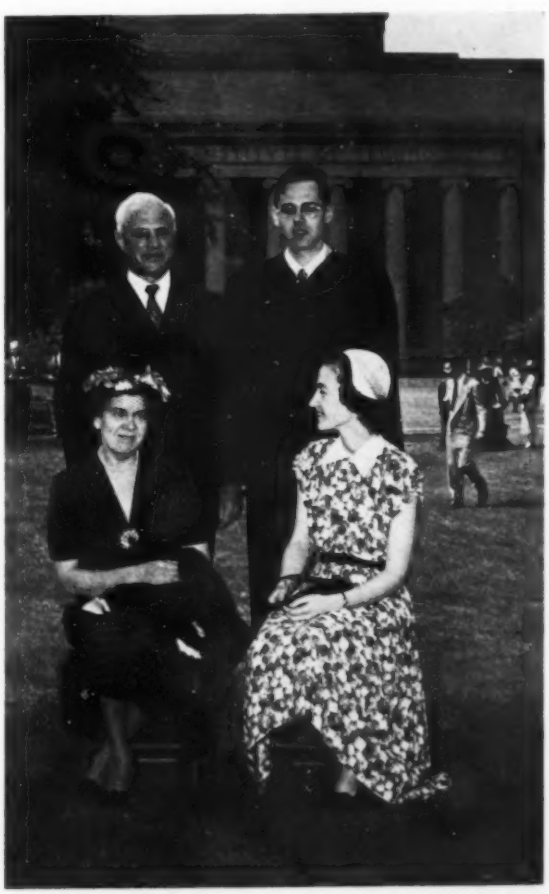
His acknowledgement of the efforts of others was no better revealed than during the Mid-Century Convocation when, in speaking of his own administration he remarked:

All three Compton brothers took part in M.I.T.'s Mid-Century Convocation in May, 1949. Left to right are Wilson Martindale Compton, then President of Washington State College, Karl Taylor Compton, President of M.I.T., and Nobel Prize Winner, Arthur Holly Compton, Chancellor of Washington University. On the occasion of the graduation from M.I.T. of Dr. Compton's son, the photograph, below, was made in June, 1951, showing Dr. and Mrs. Compton, and Mr. and Mrs. Charles Arthur Compton.

The intervening years have been full of emergencies and problems; first the great depression; then the slow recovery; then the great World War; then the period of reconversion; and now the threshold of a new era. Through these vicissitudes the institution has weathered its difficulties and has exploited its opportunities and has come through stronger than ever before.

I am convinced that this successful record is due to several factors. One of these is the complete devotion of the administration and its staff in their respective duties. Another is the unswerving decision to place service to the public ahead of personal or institutional gain. Above all, there has been clearly proven the essential value of the Institute's purpose and performance.

I shall ever be grateful for having had the opportunity to be associated with such fine colleagues in such challenging endeavor as has marked the years since 1930. The personal associations and achievements have been rich rewards for all work and worry.



His willingness to co-operate can be no better revealed than by citing an incident that occurred during the baccalaureate service on June 10. When asked if photographs might be made of him and some of the other distinguished scholars taking part in the services, he remarked quite simply, "Well, I'm here to take orders; all you have to do is let me know what you want." Such sincere, wholehearted willingness to do what might become necessary was a great stimulus to his colleagues. But no instance is recalled in which Dr. Compton issued orders; he was able to bring out the best in his associates by mere suggestions.

Karl Taylor Compton leaves a great legacy, for all who knew him were enriched by that experience. The men he trained, as well as the Institute of today, stand as a monument to his inspiring life.

Commencement and Alumni Day Activities in Brief

Kaleidoscopic events of Commencement and Alumni Day activities are shown in these selected views of events of the end of the school year. (Upper left) Brigadier General Ralph W. Zwicker, Commanding General, Camp Kilmer, Dr. Karl T. Compton, Chairman of the M.I.T. Corporation, and Brigadier General Kurt M. Landon, Chief of Staff, Air Research and Development Command, in Dr. Compton's office prior to R.O.T.C. commissioning exercises. (Upper right) Taking part in the baccalaureate service were (left to right) President Killian, '26, Professor Gilbert Highet, of Columbia University, who delivered the baccalaureate address, Dr. Karl T. Compton, and Dean of Students, E. Francis Bowditch. (Left) Leading the singing at the Alumni Day Banquet, as he has done many times before, was Orville B. Dennison, '11. (Right) In serious discussion at the Alumni Day banquet are Ralph T. Jope, '28, (left) and Senator Thomas C. Desmond, '09, of New York. (Lower left) Nathaniel McL. Sage '13, (left, with glasses) and Jerome C. Hunsaker, '12, Professor Emeritus (right with wrist watch) gather a congenial group at the Alumni Day luncheon in Du Pont Court. (Lower right) President and Mrs. Killian, Dean and Mrs. Bowditch and Dean L. Jacoby, President of the Class of 1954, receiving guests after the Commencement Day Luncheon in the Great Court. Additional photographs, as well as a complete report of the events of the 1954 Commencement and Alumni Day activities, are given beginning on page 471.

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The Trend of Affairs

"Boston Tech"

A SHARP historical need at the Institute was satisfied last month with the publication of a history of M.I.T. from its beginnings to the dedication of the Cambridge campus. Written by Samuel C. Prescott, '94, Professor Emeritus of Biology, and entitled *When M.I.T. Was "Boston Tech,"* it gives meaningful continuity to 50 years of personal sacrifice and institutional success. It is a history of events told in terms of the devoted and able men who brought to maturity the revolutionary concepts on which the Institute was founded.

The author himself has been associated with the Institute for nearly two-thirds of a century, as student, teacher, department head, dean, alumnus, and parent; and his book has been, from the outset, a labor of love and a testament of faith. No one else could have written it from so rich a background of intimate knowledge and wise perspective. It follows, too, that in addition to being good history this volume is also a personal report and an essay in interpretation and remembrance.

Dr. Prescott devotes his early chapters to the birth of the M.I.T. idea and the beginning of the M.I.T. experiment. These chapters are especially rich in references to important archival materials. Chief among these is William Barton Rogers' "Plan for a Polytechnic School in Boston" (1846) which is reproduced in an appendix. Equally important is Dr. Prescott's background material on the Rogers family and the four remarkable Rogers brothers, whom he happily compares to the Compton brothers of a later day.

The history naturally catalogues in context the Institute's famous firsts – the first physical science laboratory in America in 1869; the development of important new fields in the '80's; the first professional course in America in electrical engineering in 1882; and the course in chemical engineering – the world's first – which was begun in 1888 under Professor Walker. The pages are filled with prideful facts of this kind – for example the fruitful efforts of Sedgwick in public health; the development of the formal program in aeronautical engineering under Hunsaker; and the pioneering program in engineering administration.

Just as important to the growth and development of the Institute, perhaps, are the many lesser known facts recorded here. The pages on President Runkle, for example, review the early emphasis on practical experience in laboratory and shop and the elaborate summer field trips which Runkle himself developed. Herein are reported, too, a host of notable alumni events from the first annual meeting of the Association in 1876 to the extraordinary telephone program, following the dedication of the New Technology, in which alumni gatherings in 35 cities participated.

Professor Prescott takes particular pains to demonstrate that M.I.T. maintained from the earliest days studies in philosophy, literature, and modern languages, required all students to take subjects in this area in all four years, and from the outset offered one or more complete curricula to combine general science with the humanities. Of the first 13 graduates (1868), for example, one was granted a diploma in science and literature, and one of the aims announced in the first catalogue (1865) was "to furnish such a general education . . . as would form a fitting preparation for any of the departments of active life."

The history also shares with the reader a sensibility for the little things that recreate the temper of a time. Here are the curious names of student clubs that long ago vanished – Hammer and Tongs, Mandamin, and the dining club that had for its motto "Semper Macaroni Terrapinque." And some of these little things provoke unexpected patterns of reflection, as for example the note that among the students of the small group who began their Institute life in

the crowded rooms of the Mercantile Library was Samuel Cabot, Jr., whose father had been one of the early supporters of Rogers and whose brother, Godfey,'81, is now the oldest active life member of the Corporation.

It is hard not to write too much about this book in which the very real glory of the Institute's first 50 years is so carefully recorded. It is all here – the early struggle and unremitting toil to found a new kind of technological institute by Rogers; the early financial struggles with which Runkle was faced; the great growth and expansion under General Walker; the short administration of the modest Crafts; the improvement of social and physical facilities under Pritchett; the new problems of growth and expansion which arose in the early Twentieth Century; the difficult years, under the administration of Noyes during which the decision was made to move to Cambridge; the fabulous gift from the anonymous "Mr. Smith" whose identity as George Eastman was not revealed for almost a decade; and the final period of growth and ultimate removal from Boston to Cambridge under Maclaurin. In reporting this last event, Dr. Prescott catches all the emotions that pertain to the passing of an era. And when the official symbols and records of the Massachusetts Institute of Technology had been transferred to their new home with appropriate pomp and circumstance, "the searchlight on the new buildings rose straight into the air till it crossed in the sky the searchlight on top of the Old Rogers. After a moment, that on Rogers faded and died, and the great beam of light above the portico . . . shot straight up into the blue night sky."

This volume is unique. It is history, it is interpretation, it is remembrance. Most of all it is a tribute to M.I.T. by one who has loved her long; it should be required reading for all who love her well.

Tribute to Karl Taylor Compton

By Dagmar

It is your smile we shall remember,
Your smile, serenely warm, that you
Bestowed on all you met. Smiles say
Far more than words may signify, for
Words appeal to mind, while smiles
Like yours touch human hearts.

Historians will record your deeds;
Great men's deeds live on forever.
Scientists will praise your name
For ably representing them.
Your country's head is bowed in
Silent recognition of your love,
And eulogies have emanated from
The corners of the Earth.

But we who knew you, shall remember
Your smile, serenely warm that you
Bestowed on all you met. Smiles say
Far more than words may signify, for
Words appeal to mind, while smiles
Like yours touch human hearts.

Centennial of Amateur Photography

BELIEVER in education as the font of progress for the world, George Eastman repeatedly reaffirmed that belief by generous contributions to the advancement of learning during his lifetime. One hundred years ago, on July 12, Mr. Eastman was born in Waterville, N.Y. On the centennial of his birth, countless numbers of people will, unknowingly perhaps, be observing George Eastman's 100th birthday anniversary when they "press the button" on their cameras, or when they use the word "Kodak" as a synonym for the general term "camera."

The beginning of modern photography starts with George Eastman, for it was he who converted the art of picture-taking from a feat requiring the nimbleness of a juggler and the strength of a Hercules, to the simple act of holding the camera in the hands and pressing a button. In his spare time as a junior bank clerk in Rochester, N.Y., Mr. Eastman would often laboriously start forth on a photographic expedition equipped with tripod, camera, a tent for a darkroom, glass plates, and chemical solutions for making the light-sensitive materials on the spot as they were needed. Contrast this paraphernalia with the film loaded camera of 1954, which our generation regards as almost an accessory. Today's citizen has good cause to be deeply grateful that George Eastman had the urge to change a technical process into a simplified method suitable for use by the public at large.

George Eastman's contribution to progress was the perfection of photography. By devising photosensitive dry plates and making them available for general consumption, he eliminated the need for photographers to become manufacturing chemists. In developing flexible base material of cellulose nitrate as a support for the emulsion Mr. Eastman made possible the roll film camera and motion picture photography; in fact, Thomas Edison made his first successful "movies" on Eastman film. Mr. Eastman established the Eastman Kodak Company, founded on the photographic dry-plate business which he started in 1880, and in a few years had built up a vast business in amateur photography.

Fortunately, Mr. Eastman's interests were not limited to the field of his professional specialization, for the Massachusetts Institute of Technology and the City of Rochester, N.Y. benefited greatly from his beneficence. On the centennial of his birth the Institute looks back to 1912 when George Eastman anonymously made his first gift of $2,500,000 to Technology and pays him tribute. At a perilous era in the Institute's financial history, Mr. Eastman's gift provided the means for establishing the large group of new buildings on the Cambridge site. Mr. Eastman made several subsequent gifts, not only to cover increased construction costs of the original group of buildings, but to establish the Eastman Laboratories of Physics and Chemistry and otherwise support technical education. In all, Mr. Eastman's gifts to the Institute totaled approximately $20,000,000.

When he made his first gift to the Institute, Mr. Eastman requested complete anonymity. Richard C. Maclaurin, then President of the Institute acceded to Mr. Eastman's wish that the name of M.I.T.'s bene-

factor not be made public, and for eight years the generous giver was known only as "Mr. Smith." Indeed, so well was the secret kept that when the Institute sought to establish its school of chemical practice, Arthur D. Little,'85, appealed to Mr. Eastman for financial aid – and got it. At the time Dr. Little hardly suspected that George Eastman and "Mr. Smith" were one and the same person.

As a successful industrialist, Mr. Eastman's interest in Technology was not founded on sentiment alone. He had faith in the Faculty of the Institute and in its student body. He first came to know Alumni through the employ of the late Darragh de Lancey, '90, and Frank W. Lovejoy,'94. The integrity and ability of these men so impressed him that he read the annual reports of President Maclaurin for nearly two decades as he noted the financial value to industry of technically trained men. He believed that Institute graduates possessed a high standard of ethics, and that no man could go through Technology without learning of his obligations to his country.

Although M.I.T. shared a great portion of Mr. Eastman's fortune, he did not confine his gifts to this technical and scientific school which mourned his death in 1932. Also benefitted were the University of Rochester, Hampton Institute, Tuskegee Institute, and the City of Rochester, N.Y.

Mr. Eastman's accomplishments mark milestones in American industry not confined to the field of photography alone. He was one of the first American business men to establish a wage-dividend plan. He was also one of the first to realize the value of pure research as an aid to industry. May M.I.T. and American industry continue to justify his faith as July 12 is marked.

George Eastman,
the centennial of whose birth occurs on July 12, popularized photography among millions of persons with dry roll film, Kodak camera, and philosophy of "you push the button, we do the rest." A wise and generous benefactor to educational causes, Mr. Eastman preferred anonymity in his munificent gift to the Institute which enabled M.I.T. to move from cramped quarters in Boston to its present location in Cambridge on the Charles River.

M.I.T. to Build Nuclear Reactor

PLANS for a nuclear reactor to be privately financed and devoted solely to education and non-secret research in the peacetime applications of nuclear power were announced by President Killian on June 11.

The first nuclear reactor, planned for construction in New England, will be used in an ever widening search for fundamental knowledge and for the solution of engineering problems in the new and promising field of nuclear engineering.

"Underlying this decision," said Dr. Killian, "is the conviction that nuclear technology will be of steadily increasing importance to the nation, and of very special importance to New England. There is no reactor in this region at the present time and there should be if New England is to secure its proper share of the new technology's benefits."

Coupled with this new reactor are plans for a new building for the physical sciences. The M.I.T. reactor will be useful not only to engineers but to scientists, including physicists, chemists, as well as investigators in the fields of biology and medicine. At the appropriate time approval of the Atomic Energy Commission will be sought for the allocation of the necessary fuel. It is estimated that the total cost of the reactor laboratory, a non-military and unclassified project, will be about $1,000,000.

In commenting on this latest part of the M.I.T. program in nuclear engineering, President Killian said:

In making these plans, we are moved by firm conviction that the development of atomic energy for peaceful use is important to the spirit and to the leadership of America. Though the United States must of necessity build bombs in a world out of joint, we will move ahead into a better and happier era only by improving the lot of mankind and addressing ourselves to more noble ends than sheer atomic might.

The use of science for defense is necessary, and we cannot be strong without it. But such use of science and technology is not a natural or satisfying use and in the end can only thwart and distort their true spirit. Bold and imaginative acts by Americans to demonstrate the moral purpose and the non-military uses of science and technology, particularly atomic energy, can contribute to our own resources and to our leadership of a world seeking peace. Our great resources of intelligence, imagination, ingenuity and risk-taking spirit are moral forces that can lead the world out of a cold war.

Science, with its spirit of creativity, its search for understanding, its dependence on freedom and good will, and its world-wide currency, offers an avenue to a higher standard of living for all the world. But more importantly it can lead to a resurgence of a spirit of reconciliation and good will among nations. In this period of cold war, we are engaged not only in an atomic armaments race, but in a race to apply atomic energy to peaceful

and beneficial uses. This is a race we must win, not only for our own welfare but for our influence in the community of the free world.

Speaking of the future of education and research in nuclear engineering, Dr. Killian explained that in 1951 the Institute established a graduate program in nuclear science. He said:

These programs, operated by a staff of exceptional competence, need the addition of such a facility as the reactor to be fully effective in their education and research objective. We are well aware that there will be a steadily increasing demand for nuclear engineers and that these engineers will help to accelerate the beneficial uses of the atom in the same way that the chemical engineers helped in putting molecules to work.

An important reason why we have decided to proceed with construction of a reactor lies in the growing conviction that the benign and non-secret use of atomic energy for the health and welfare of man requires a multiplication of private research groups working in areas that have been declassified and which are seeking primarily to advance knowledge or to make technological advances which will serve economic ends and be subject to industrial development.

The recent action of the New England Council of Governors in appointing its own Atomic Energy Committee is evidence of their concern for expediting the public benefits potentially present in this new area of technology. In the last two decades we have seen how research and development in electronics helped this state and this region to acquire a flourishing new industry. The same is possible in nucleonics, a field in which we already have a start through a group of enterprising engineers and industrialists. Research begets more research, and a concentration of research in nuclear technology will encourage both more research and new industry.

As a nation and a region we have a growing appreciation of the importance of energy to our strength, our wealth, and our welfare. Atomic energy is not yet economically feasible, but its practical use is looming over the horizon, and the way to hasten its commercial use is patiently to develop the men and the technology which must be available to achieve any great industrial advance.

Dr. Killian emphasized what he called the "strategic location" of the proposed reactor. "Not only will it be located in one of the greatest industrial states, rich in technical experience and with a history of industrial innovation," he said, "but it will be in proximity to what I think it is fair to say is probably the greatest and most varied concentration of scientific, engineering, and research talent in the world." He added:

Happily it is to be built at a time when American industry is supporting educational research at an unprecedented rate. This kind of financial support not only advances education and knowledge, but will ultimately return to industry the new products and new methods needed for a dynamic economy.

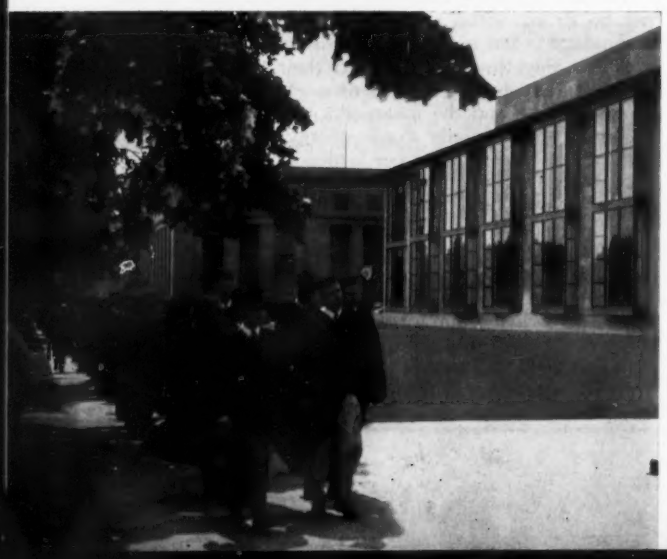
The importance of this immense new field cannot be overestimated, and we look forward particularly to associating with us a group of industrial companies who wish to be in contact with this advancing technology.

A nuclear reactor is basically a new type of furnace for producing useful energy from uranium or thorium, both of which are found in naturally abundant minerals. In an ordinary furnace chemical reactions occur in an atmosphere of oxygen, and only a fraction of the modest energies associated with the chemical fuel – coal, oil, or gas – is released.

In a nuclear furnace an atmosphere of neutrons causes nuclear reactions which releases the immensely greater energies which bind together the nucleus. For comparison, a given amount of uranium fuel undergoing nuclear combustion will release two million times as much energy as the same amount of coal. Beside being an extremely compact energy source, the nuclear fuel also has the unique ability to regenerate its own neutron atmosphere for nuclear combustion, and hence the nuclear furnace is independent of air for sustained operation. These are the important factors which have motivated the development of the nuclear-powered submarine, a real underseas craft, which was launched last spring at Groton, Conn.

Recently the Atomic Energy Commission announced the beginning of a five-year program for the development of nuclear reactors for the production of commercial power. These nuclear power plants may eventually be of great importance in meeting the rapidly increasing demands for industrial power in many sections of our country, including New England.

Members of the Class of 1954 march up Memorial Drive past the Charles M. Hayden Library on their way to baccalaureate services in Walker Memorial.

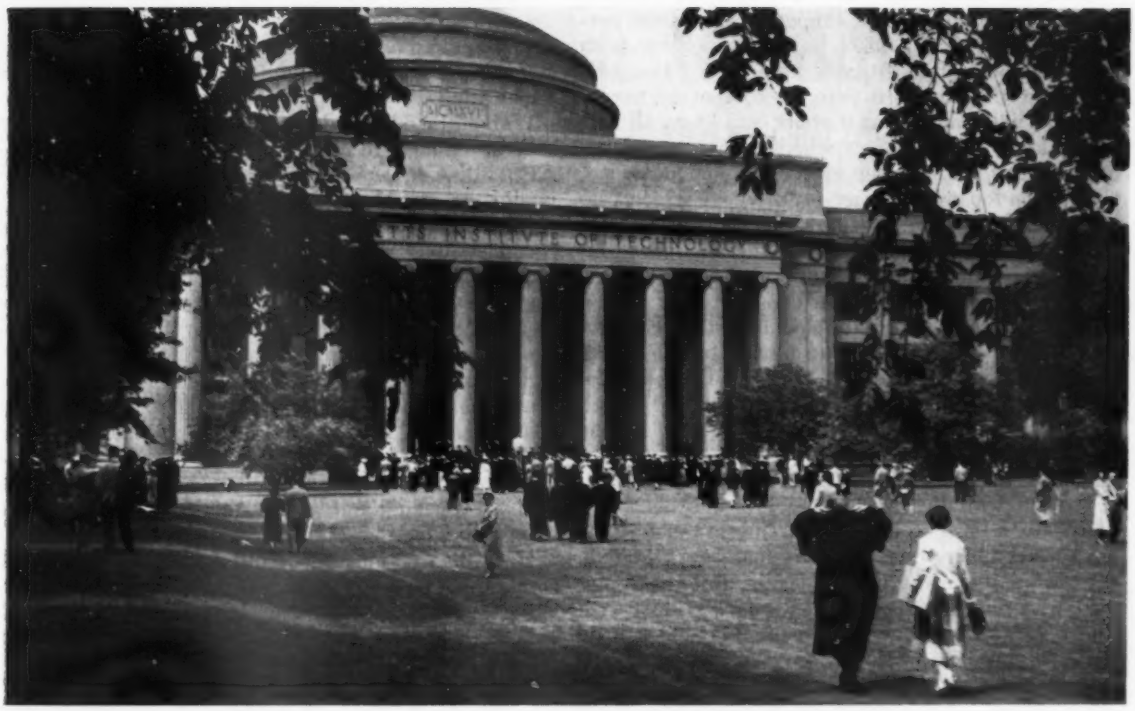


Boston to Have Educational TV

BOSTON'S non-commercial educational television station, which will be in operation this fall on Channel 2, recently acquired space for its television studios in a building adjacent to M.I.T. Papers for the lease of a former rollerskating rink at 84 Massachusetts Avenue, Cambridge, were recently signed by Ralph Lowell, President of the WGBH Educational Foundation, and James R. Killian, Jr.,'26, President of M.I.T., which owns the building.

The WGBH Educational Foundation, which will operate Channel 2 under the call letters WGBH-TV, will occupy almost the entire second and third floors of the modern brick building opposite the main entrance of M.I.T. The studio and offices acquired by the WGBH Foundation consist of approximately 11,000 square feet of floor space. The net area of what was formerly the roller skating rink measures 52 by

(*Concluded on page 492*)



The Educated Man

He Has the Interest and Ability to Continue Learning, An Insight into Human Behavior, and Recognizes That His First Duty is toward His Country

By CLARENCE B. RANDALL

COMMENCEMENT ADDRESS

One who has never stood where I now stand and has never embarked upon the adventure I am about to embark upon, cannot understand the awe and humility with which one faces such a great audience and on such a moving occasion. The excitement in the air today has affected every person in this great congregation. This is America, to me. It has no counterpart anywhere else in the world, and I sense here today in our midst the great spiritual values of our American heritage which we are all dedicated to preserve. It is a privilege for me to stand here as an American businessman, and express by my presence the partnership between the enterprise system based on freedoms and the freedom of inquiry in educational institutions. It is a privilege for me to express once again my belief that the freedom of the marketplace and academic freedom are but phases of the same freedom; and that businessmen must support the privately endowed institutions and that these institutions must, in turn, understand and assist business. We are met together in the name of education, privately maintained education, which really, in the last analysis, is the sole guarantee of that spirit of free inquiry so essential to the preservation of our democracy.

Since the businessman rarely has the opportunity to face up to the educators at a time when they can't talk back, I shall be a bit bold this morning, and as my first act of boldness, I will give my definition of the educated man. I hold that the educated man is one who understands himself and the world in which he lives. He senses to the full the relationship between the two. No job, my young friends, for four years; that's a job for a lifetime. I will even go so far as to outline the hallmarks of the educated man as I understand them. That is brashness indeed, in this distinguished company. I hold that first the educated man will have a philosophy of life to which he holds true. He will know what he believes and live by it. He will have goals and objectives for his life, formed, if you will, this very day as he closes his formal education. He will let the desire to reach those goals and objectives govern all of his conduct all of his life. He will know that he came into this world not by accident but by Divine will. He will sense that his life is a part of something far greater than himself, and he will know that at birth he was endowed with certain gifts and certain talents and deprived of others. He will undertake to develop the full potential that may be expected from those gifts and talents.

Then, the educated man intellectually will demonstrate a capacity to master, I repeat master, some particular subject. The field of human knowledge is so wide that no man can touch more than a tiny segment, but the educated man, as to that particular segment, will simply tear it apart, and know all that he can know about it. Now when I come to an institution of this kind to interview young men and select young men for my company – a privilege which I do not have the chance to enjoy as much now as I did in earlier years – I care not at all what his specialization was. I do not employ young men for what they know. I employ them for their capacity, their proven capacity, to learn. And in the steel industry I care not whether the man masters metallurgy or the Greek classics as long as he has that final intellectual capacity. I want the precision found in the metallurgist but I want also the power to appreciate the logical and clarity of expression of the Greek philosophers, for both those qualities are required in business. Confidentially, this is a touch of bias because I do occupy a position of responsibility in the steel industry, yet in my own undergraduate days I made my best marks in the Greek classics. But the young man who selects a specialty and stays with it, will lead a very narrow and limited life, and will not go far in the business world. Once he has demonstrated his mastery of one subject, he must demonstrate another quality – the willingness to tackle something for which he was not trained, and the intellectual courage to pursue a subject which he finds distasteful and unpleasant. To be specific, the metallurgist, for example, if he is to live a useful life in business, must not only understand matter, but he must be prepared to understand industrial relations and abstract subjects that cannot be solved on a factual basis.

So I want the young man who joins my company to display a readiness to rise above the specialty in which he was trained and take on an unpleasant intellectual job for which he was not trained and lick it. No young man ever lives out his life doing what he thought he was going to do, and he will be quite ill at ease in later life if he does not have that elasticity by which he may move smoothly and adroitly into whatever field his life leads him. After all, the capacity to think straight and clearly will put a man at home in any subject. I even make bold to say that the businessman can understand the processes of education.

Then the educated man in this modern world must be articulate. He must learn to write and speak the English language clearly and convincingly. Knowledge is no good unless it is communicated. The only purpose of education is to do something with what you know. I yield to no man in my admiration of those who study the great books, but it is not enough to know the philosophy of Aristotle. You must not stay locked up within the great books. Aristotle's philosophy is meaningless unless it is put to work in the modern world. This is the age of ideas. Throughout the world men are struggling to capture other men's minds. And I say it in this presence, because, with deep respect and affection for all of you, the technically trained man often has much to learn about speaking and writing the English language. If he is to have the influence in the world to which he is entitled, he must make his contribution to the formation of public opinion. The educated man will also have a deep sense of responsibility. He will not only be content with knowing facts, he will not only have knowledge, he must have insight – insight into human behavior. He must understand the heart as well as the head. He must learn to deal with emotions as well as with the mind. And this is something not well taught in the university, and if I may say so, not well taught at all, presently, in the institutions that deal with the sciences.

Throughout industry and throughout our community at large, we must understand why people do what they do. We begin that by understanding ourselves. We must be sensitive to our surroundings; aware of the impact of what we say and do upon others, and we must reduce the limitations and build upon the strengths.

The young man coming out into industry finds himself a member of a team. Confidentially, you won't much like the fellow that works next to you. You

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This year, as has been the custom since 1949, Commencement ceremonies were held in the Rockwell Cage. President Killian is at the speaker's rostrum. Members of the M.I.T. Corporation and Faculty, together with representatives of the 50 and 25 year classes are seated on the stage.

Our Greatest Resource

The Youth of America Is Learning That Personal Liberty, Depending upon The Respect For Truth and Decency, Makes Demands of Service to Their Fellow Men

By RICHARD L. BOWDITCH

ALUMNI DAY LUNCHEON ADDRESS

On this occasion, and in this great New England Institution, it seems to me appropriate to follow the tradition of the old New England preacher and "take a text."

The quotation which I use as a point of departure for my remarks this afternoon is from an address delivered recently by President James R. Killian, Jr., '26, in saluting the opening of a new graduate school at Brandeis University. President Killian said:

> Society has invented the university to perpetuate itself and to create its future. Practical planning and prudence thus motivate the founding and building of a university. But there is something more. The building of a noble university is an expression of the generous impulses, the high purposes, and the soaring aspirations of a free society. The university serves the present, but it does this better if it preoccupies itself with the possibilities of the future.

While Dr. Killian modestly limited, to institutions of learning, the need for concern with the future, he stated an almost universal truth. Whatever our positions in society, all of us also serve the present, and all of us will do a better job of serving insofar as we actively preoccupy ourselves with the future. Indeed, keeping a weather eye on the possibilities of the years ahead seems imperative, not only to success but to survival. Our competitive system has little patience with the man of limited vision.

Until recently the American businessman measured the future largely in terms of things. His assignment was to turn the vast natural resources of this continent into the material objects needed by an expanding population, and then to distribute them as equitably as possible under the pressures and rewards of private enterprise. His look ahead was mainly and necessarily devoted to planning for new and better goods and services at lowered costs. But this was not enough, as two gigantic wars and this country's emergence as leader of the free world have taught him. However great our natural resources, and however important may be their judicious exploitation, we have another resource which is still greater and infinitely more important – the youth of America. I cannot overstate the case. The present is ours – yours and mine – to serve as best we can. But our future rests with our children. Their character and spirit, their vision and energy, will determine the course this country takes in years to come. This nation was built by the young and the young-at-heart. It is the product of those qualities always associated with youth – the broad highway, the big idea, the bold approach, the recognition of opportunity, the calculated risk, the ultimate reward. This is the American pattern, and it has brought us the world's highest standard of living and world leadership.

But our future rests with our young. How do they estimate their future? I confess I'm troubled. This winter, the publisher of the *Journal of Commerce*, writing in his personal column, expressed his belief that a preoccupation with security was shaping up as a vital problem in the fight to preserve our democratic and private enterprise systems. The reaction to this pronouncement was immediate and extensive. Leaders from a cross-section of our major industries wrote their unhappy agreement with Mr. Ridder's viewpoint. Young job applicants, they reported, were more interested in security and fringe benefits than in chances for advancement. The challenge of the job, the spirit of risk-and-win, now appear to be overshadowed by concern with retirement systems, vacation arrangements, and sick leave payments. While I have repeatedly run across this attitude myself, I want to make it absolutely clear that I'm not handing down a blanket indictment of young people. There are many, many exceptions. But the overconcern with security is far too widespread to be ignored. Our economy depends on expansion, and the rewards of this economy and the safety of America are in direct proportion to the risks we take.

We must admit that circumstances have conspired against American youth. This era has asked more from our young men than any other. We have lived under arsenal conditions for half a generation, and in spite of the prevailing but always uncertain truce, we do not dare eliminate the draft. My own generation has saddled youth with a national debt without precedent in world history. Except for some fiscal miracle, the young man of today will live with high taxes for all his years. For these and other reasons, his likelihood of acquiring a personal fortune diminishes steadily. These factors explain a part of youth's preoccupation with security. Perhaps the rest of it arises from my failure and yours – the failure of all of us – to demonstrate that we still live in a land and in a time of enormous opportunity – a time designed for inquiring minds and skilled hands.

I need not elaborate to the audience, assembled within the walls of this great institution, that the frontiers of our economy are constantly to be expanded. The future expansion of the American economy is inevitable – if we can preserve the free market system. But we cannot hope to preserve the

market system unless our economic system is understood as well as we understand our free social institutions. They are opposite sides of the same coin. We owe our present national security and our comparative abundance to our mastery of the physical sciences and our ability to put the productivity of our knowledge on the industrial assembly lines. Our future is even more dependent on science and productivity.

In the present world crisis, we must conserve our manpower and develop its skills to keep safely ahead of the mass-population areas. Our dropouts in high school are more serious than a shortage of vital war materials. We are past-masters at finding substitutes for materials. There is no substitute for education in developing skills of both mind and hand! The future of our nation, the growth of our American culture, and the maintenance of our free-world leadership all begin in your home and mine – in the 45 million households of this broad land. Here the character and destiny of our children is given early shape. Here they absorb the concepts of good and evil which will direct their subsequent courses. Here, within the framework of the family unit, they learn the give and take – the duties, punishments, and rewards – of the whole democratic social system. Let us be sure that the sets of values our children learn from us as parents include tolerance and justice, and the desire and the courage to make some contribution to human welfare and progress.

Of equal importance in molding our youngsters for their responsibilities as citizens, and as proponents of democracy, is our whole educational system. To our public school teachers we turn over the most precious thing in America, and at the most delicate period in its formation. But all too frequently, we ask these teachers to carry on their vital work in cramped, outmoded, physical plants which we would never tolerate in our businesses – and at salaries less than we pay our secretaries. Then, compounding the injury, we deplore the quality of their output; the ignorance and irresponsibility of the young; their cynicism; their lack of initiative. Now, I suspect that older generations have always felt this way about their children – that our parents felt this way about us. But the fact that the young usually measure up to the old cannot absolve us from doing our utmost to make them wiser and happier people than we are. They will need to be, to live in the debt-ridden, dangerous world we are bequeathing them. The continual upgrading of the minds and bodies of an expanding people is a difficult and painful process, especially in a society as complex and full of change as ours. But it is paramount to our survival and leadership, for education is our first line of defense. And education begins, like most other things, with money – more money for more and better schools; and more money for more and better teachers. The need is now, it is imperative, and it ranges throughout the educational system from kindergarten to college, from primary to professional school. Surely, the richest nation on earth can meet at least this material need! And surely the genius of American business can devise how best to do it.

But there is a second need which must be met if education is to make its greatest possible contribution to the full flowering of the American people. Nothing must hamper its freedom of inquiry and discussion. This nation was conceived and rose to world leadership on the ideas of nonconformists and free-wheelers, of men and women of integrity and wide vision, of individuals with bold, far-reaching minds, who insisted on crossing the frontiers of the unknown. By every estimate they were courageous people. They dared to disagree on many things, but our country and our culture are infinitely richer and stronger for their challenge. We must indoctrinate our young people with the desire to be courageous, to have the will to win, to seek the truth, never to

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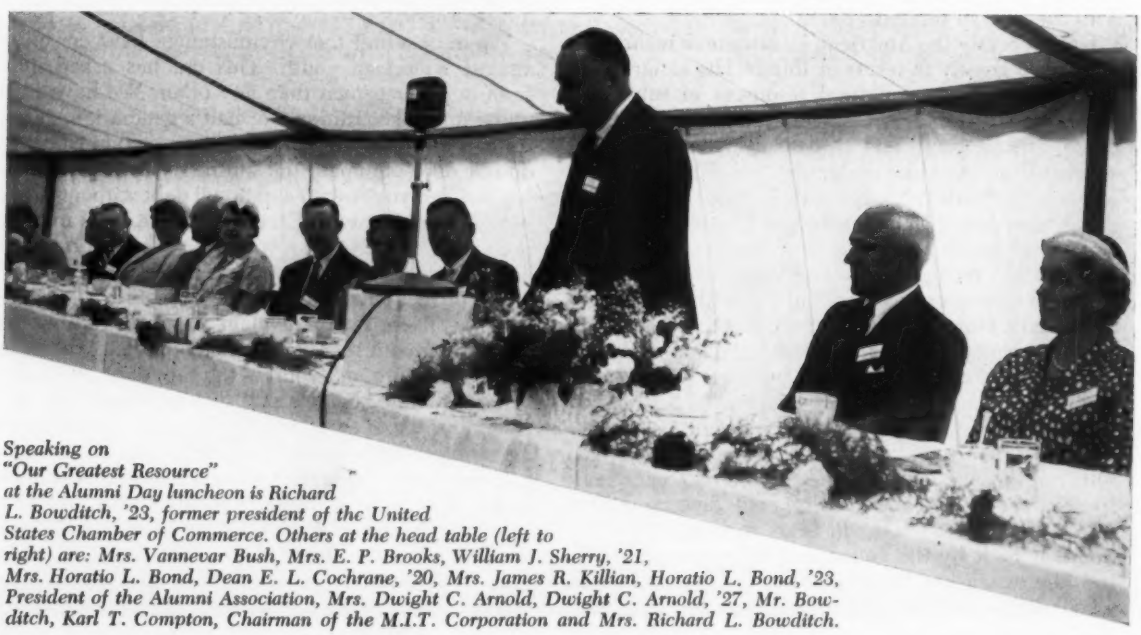

Speaking on "Our Greatest Resource" at the Alumni Day luncheon is Richard L. Bowditch, '23, former president of the United States Chamber of Commerce. Others at the head table (left to right) are: Mrs. Vannevar Bush, Mrs. E. P. Brooks, William J. Sherry, '21, Mrs. Horatio L. Bond, Dean E. L. Cochrane, '20, Mrs. James R. Killian, Horatio L. Bond, '23, President of the Alumni Association, Mrs. Dwight C. Arnold, Dwight C. Arnold, '27, Mr. Bowditch, Karl T. Compton, Chairman of the M.I.T. Corporation and Mrs. Richard L. Bowditch.

The Engineer in Management

Well Trained in The Orderly Processes Of Thinking, Engineers Sometimes Fail in Dealing with Things Which Cannot Be Solved by Logic Alone

By WILLIAM B. GIVEN
ALUMNI DAY BANQUET ADDRESS

My college career was in engineering, although the original plan had been for me to take an academic course followed by study at law school. My background is different from yours – you probably understood what you were studying. I selected engineering because, although I knew I would never succeed as an engineer, I felt that studying engineering at M.I.T. would increase my chance of climbing some management ladder. Technology, with its School of Industrial Management, has trained many, and will increasingly develop more and more, engineers in management responsibilities.

It is odd how ambitions change. While here at M.I.T., my ambition was to graduate. In industry, at first it was to be kept a long time and, some years later, it was to become head of the company. During the last period of years, my target has been the development of a management team.

In looking back, we, who have had a long period as seniors, are amazed by the total effort which has been put into the study of human factors entering into executive development. Tonight I want to talk about engineers in management.

You know there are many different types of engineers and among them all kinds of people. We ceased long ago being surprised by the engineers who reached the top in almost every type of business. Some never needed help. Many would have gone further in management if they had been helped to a better understanding of the many facets of such responsibilities. Many who reached top positions in management acquired the habit of searching for help beyond that available in text books. When still young, they recognized that asking for help neither indicated personal weakness nor entailed an imposition on busy people.

Fifty years ago our company was proud of its one engineering school graduate – from Lehigh. He was a grand person but so factual that the sales department would not permit him to call on purchasing agents. Twenty-five years ago, the number had increased amazingly. Today, in our top 25 positions there are 15 who are graduate engineers, and six who have high engineering knowledge, acquired through study at home or in night school. For each of these men, engineering was step number one toward their management jobs. In my opinion, this number would be still higher if some of the engineers had had a better understanding of the humanities and their bosses had done more about instilling in them a wider knowledge of business and management.

Many of you have spent this morning looking into the future with the end purpose of exploring what will be needed in knowledge and talents to meet our needs in the 10 years ahead. Certainly further decentralization of management is a necessity if we are to capitalize successfully on tomorrow's opportunities. Today, there seem to be two concepts of decentralization. With one, the senior's assignment is primarily that of establishing the policies, setting the course, selecting the people, and then judging the effectiveness of the job done. In the other, the seniors take as an additional assignment, that of coach. The coach must be on the field, which means traveling the company, knowing the people he is coaching, really knowing them. Regardless of the method used to develop them, the need for capable executives is deep and urgent. Successfully meeting whatever is ahead will be largely on the shoulders of engineers. Our problem is: "How can we prepare for the period ahead, and how can we help others to be more fully prepared?" Also, what else can the school of technology do for engineers who hope for management places?

Thinking in terms of preparation for management jobs, what are some of the vital qualifications? How does one go about improving in those areas? What failings are too frequently found in engineers? Not having understood engineering myself, maybe I am overly conscious at times of the boats missed by some of the engineers in our company. In reverse, I certainly am conscious of how engineering develops many assets greatly needed by the capable executive. Engineers are well trained in the orderly processes of thinking. They learn to accumulate the facts, to arrange and analyze them logically and to base conclusions and decisions on their findings. This approach is ideal for a multitude of business problems. Technical training also provides a background of fundamentals which make it easy to grasp quickly the principles of machinery, methods of manufacturing, structure of the organization, and details of the product. In management many engineers are willing to gamble on their convictions, as, for instance, by letting the inventory of scrap iron reach a seemingly dangerous volume in a market of declining prices. The over-confident gamblers are dangerous but the over-cautious ones are dangerous too. These qualities are valuable and give the engineer an advantage over the non-technical man.

Now, what are the failings frequently found in individual engineers? Our experience through the

William B. Given, '08, delivering his address, "Engineers in Management" at the Alumni Day banquet on June 14. Others at the head table are: Donald W. Kitchen, '19, (hidden by microphone) Donald P. Severance, '38, Louis H. G. Bouscaren, '04, President Killian, Theodore T. Miller, '22, Mr. Given, Karl T. Compton, Vannevar Bush, '16, Horatio L. Bond, '23, President of the Alumni Association, and Hugh S. Ferguson, '23, incoming President.

years points up several. Some engineers are weak in their understanding of people and how to deal with human problems. Their breadth and scope is narrow, thereby limiting their horizons. Many lack financial sense, the ability to analyze profit and loss statements, knowledge of accounting procedures, banking, taxes, and the many other aspects of any broad administrative job.

Every management place entails a great deal of negotiating – contracts, purchases, labor disputes – all presenting difficult problems. Many people are born with talent in this. Others become challenged by the need and acquire skill through experience. Certainly ability to negotiate successfully is high on the list of talent needs for management and one which a large portion of engineers do acquire. My first thrilling go at a negotiation came with printers when I was Business Manager of the 1908 *Technique*.

It is well for engineering students and graduates to explore – and find out – which subjects not studied by them help academic graduates most to qualify for management places. Certainly the courses which result in better understanding of clear English do that. All of us can acquire a clearer understanding of what sentences and phrases really mean by reading good books. Biographies are a help to a better understanding of people as well as of English. Books of essays can contribute greatly. History courses have helped many to a better understanding of individuals and of groups – as well as a clearer use of English. Figures highlight the route to the solution of many problems. Our company has had men come to it who have taken all the accounting available in college and others who have taken such courses after joining our ranks. Their efforts have paid dividends in advancement.

As a preliminary step in preparing my talk this evening, I wrote to 18 of our important people – four did not go to college, four took academic courses, and 10 are engineering school graduates. My question to them was: "What are your ideas as to the things you believe engineers need to supplement their training, in order to meet the problem encountered in management jobs?" Each man – and I know them all well – gave careful thought to the question. I wish every engineering student and young engineers just out of college could read those answers. I know that, for me, they would have highlighted my needs while I was a student. Let me quote just a few of their comments:

One Bachelor of Arts graduate, heading a group of plants, wrote: "An engineering degree gives the individual a background in fundamentals and principles which can be applied to any business. In many instances, depending on the type of work, the engineer has a distinct advantage in that he is able to grasp and conquer technical problems more quickly than people with general or non-technical training." He also wrote: "The greatest area of development for an engineer is with people." Again, "To be a manager he cannot be only a skilled craftsman. He must also be a warm, understanding, friendly, sincere person. Before leading a team, the engineer must learn to play to the limit in his role of a team member."

Another man with a B.A. degree wrote: "Many engineers do not realize the importance of the things which cannot be measured, such as attitudes, emotions, customs, traditions, prejudices. As a consequence they fail in dealing with those things which cannot be solved by logic alone." A liberal arts education seems to produce better deciders, while an engineering education produces better carry-outers.

A Yale engineer wrote: "Engineers live largely with rules. In management one of the most important

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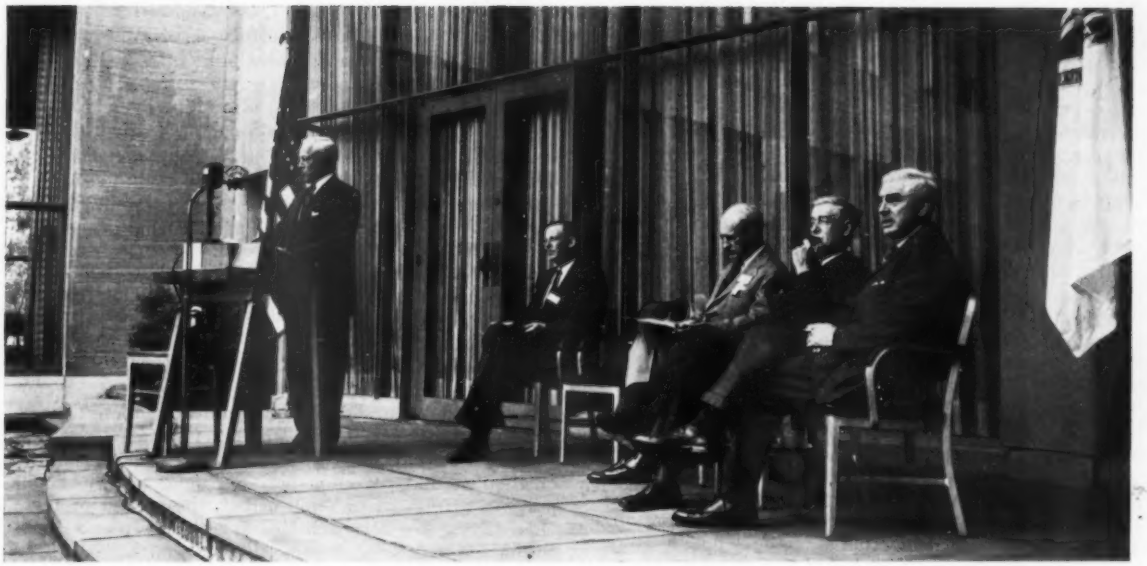


The Alumni Day Symposium, "The Next 10 Years," was held in the court of the Hayden Library. Taking part in the activities are (left to right) Karl T. Compton, Horatio L. Bond, '23, President of the Alumni Association, Dean E. L. Cochrane, '20, Vannevar Bush, '16, and Dean E. P. Brooks, '17.

The Next 10 Years

Survey of Anticipated Progress in Science and Engineering

As Revealed During the Alumni Day Symposium and

Reported by The Technology Review Staff

AFTER a respite during the past several years, there was resumed an earlier custom of identifying Alumni Day with a theme of national or even international significance, and a program in which leaders in technology took part in a forum at which important problems of the day were discussed. This year the formal part of Alumni Day was opened with a symposium on "The Next 10 Years," intended to provide a perspective on some of the problems that confront us and on some of the measures we can take to meet them.

The morning conference was held in the Hayden Library Court, with Karl T. Compton, Chairman of the M.I.T. Corporation, presiding and making the introductory address. Vannevar Bush, '16, President of the Carnegie Institution of Washington, spoke on "An Engineering Outlook," Edward L. Cochrane, '20, Dean of Engineering at M.I.T., spoke on "The Opportunity for Engineering," and E. P. Brooks, '17, Dean of the School of Industrial Management, took the topic "What Management Can Do." A condensation of these four addresses is presented below.

Introduction

Although his remarks were intended, primarily, to introduce the three speakers whose subjects were enumerated above, in opening the symposium Dr. Compton pointed out that the conference was intended to provide time to examine some trends in our changing world and to explore some of the newer engineering tools and management methods. In essence, Dr. Compton said:

We meet this morning to hold another annual conference dealing with problems of international importance. Some of you in attendance today may remember the earlier conference we held, prior to World War II, on the "Technology of Defense," and the post-war conference on the "Technology of Peace." Today we meet to discuss "The Next 10 Years," which optimists insist will be highly creative, and which period the pessimists look to with gloom.

Both optimistic and pessimistic sides were amply demonstrated in a recent conference on population problems. The first two days of the conference were devoted to a discussion of the rapid growth of the world's population, and the less rapid expansion of its food supply. It was concluded that the gloomy picture which was painted would provide fertile fields for future social unrest. While this point of view was based on world-wide surveys the same unbalance between food supply and population looms in the United States. Conservationists added to the gloom by recalling to mind the dwindling resources of our nation, and the increasing rate of consumption. The third day of the conference struck another note, however, and optimism became evident when the

progress which science and engineering had made in finding new and untapped resources of food and minerals was recalled. At the conclusion of the conference, one of the speakers was asked how long it would be before technology would be truly effective in producing sufficient food to eliminate want, and was told, perhaps in 50 years. The questioner remarked that India might well fall under Communistic domination within the next year. Thus was pointed up the necessity to consider the time relationship between events taking place in the world today and trends in technological progress.

In a recent issue of the *Scientific American*, Gerard Piel pointed out that the purchasing power of the average American has doubled in the last 50 years; during the same period, the number of man-hours required to produce the necessities of life has steadily decreased. Our productivity has increased because of our increased use of mechanization, and the vast contributions which have been made to our well-being through science, engineering, and technology. Yet an industrial society can be operated satisfactorily only by technically trained persons, and there is evidence that the demands of industry already outstrip the supply of technically trained persons. The situation is especially discouraging when it is realized that Russia trains technical personnel at almost double the rate we do here in the United States, and that we have only our technical knowledge and our ability – not manpower – to look to for providing superiority over the Communists.

There are two opposing forces in the world today. One of these is tradition, or custom, which tends to maintain a status quo; the other is a driving urge for progress. Those who hold traditional views may be "made that way" and perhaps cannot help their points of view. But there is danger in holding too strongly to the traditional point of view.

Science, engineering, and architecture represent the second point of view which is marked by a drive for progress; indeed the professor in technical institutions may be referred to as a "textbook wired for sound." Such men are progressive in the best sense of the word, and our progress depends upon making their creativeness as helpful and useful as possible.

The confusion which we so often witness in public discussions at the present time seems to be largely the result of a conflict between the conservative and the progressive points of view. This is especially true, it seems, as regards the problem of national security. Now national security is achieved by being as far ahead of your enemy as possible, and this can be obtained in two ways: (1) we can advance our strength through knowledge, and the proper application of knowledge, as we do in putting science and engineering to work for mankind, or (2) we can keep our enemy in ignorance of our aims and achievements, as we seek to do through secrecy and "security programs" of one kind of another. To achieve our national objective, we require a greater comprehension of the need to keep going ahead. Most scientists and engineers do realize this important point, but the public evidently does not, and many public officials exhibit a complete ignorance of this essential need. On the national scale, we need a much better balance in recognizing the true significance of these opposite means of improving our power over enemies.

An Engineering Outlook

At the conclusion of his introductory remarks, Dr. Compton then introduced Vannevar Bush, '16, former professor of electrical engineering, dean of engineering and vice-president at M.I.T., and a life member of the M.I.T. Corporation. Dr. Bush, currently president of the Carnegie Institution of Washington, spoke on "An Engineering Outlook" in essentially the manner reported below.

It is always a pleasure for me to join a discussion group at M.I.T., not only because of my past pleasant associations with you, but because these meetings generate a spirit of stimulation and progress which is infectious. My part on the program is to try to predict what is ahead of us in the field of technology for the next decade. Now prophecy is a difficult undertaking upon which I embark only because the words we exchange this morning will be long forgotten before there is time to check on the precision of our prophecy.

Science lays before us a path that divides into two forks. On the one hand we see science making major contributions to war and devastation and we deplore this use of man's knowledge. But on the other hand science provides untold opportunities for health, leisure, and the creation of understanding between men. It will be our purpose to pursue, to some extent, the second of these alternatives. We approach this assignment in some confusion and with some dissension, for we might well spend the entire morning on this theme without making any appreciable headway in resolving the problem.

Let us begin by asking ourselves what can be accomplished by science. As we look to the new fields which science opens for us, we see enormous opportunities stretching before us in many fields; opportunities such as have never before been available to mankind. Consider biology alone, for a moment. Here a great surge of knowledge is being built up; we are on the verge of new discoveries of major importance and perhaps the dam is about to break as the accumulated knowledge of the last decades is let loose. There is a ferment in the studies which have been going on in genetics, embryology, virology, endocrinology, and other branches of biology, and in the applications of biology which have brought forth vitamins, penicillin and other antibiotics. And yet only the barest beginnings have been made; as we begin to understand more of biology and apply it for man's welfare, we shall make astounding progress.

The efficacy of medicine has increased tremendously as new tools of analysis and research appear, and as a result we have a new therapeutic approach to diseases such as epilepsy. We have also recently developed new approaches to an understanding of schizophrenia and other aberrations of the mind. Mental illnesses are the causes for the largest number of hospital patients, and with the progress we are now able to make in the study and cure of such diseases, we may well empty many beds of the nation's hospitals which are now devoted to holding of mental patients. The progress that is possible in this direction may well open a new phase in the life of civilization. But the new knowledge that is being rapidly acquired regarding the understanding of the human mind and body has its pitfalls and potential dangers as well as its beneficial aspects; we shall all be appalled at – and must guard against – the improper use of such new knowledge. Here is a danger that cannot be overestimated, and our need is one of learning how to make proper use of our knowledge, as well as to develop the knowledge itself.

The agricultural sciences – with the study of soil, insecticides, and new species of plant life – is another promising field of scientific research. Again this field shows promise of great advance in expanding food supplies to meet the needs of our rapidly growing population. From the days of hand-to-mouth existence, we have reached the point, by way of mass production and

preservation of foods, where starvation no longer need be a serious threat to the world's population. Even though we are not yet able to control the weather, we are making great progress, and we may even be facing a period of great food surpluses. I do not think this is too serious, for surely if our scientists can produce enough food to feed the world, we ought to expect our economists to be able to find a way to make proper use of the products of the soil. In any event, the availability of adequate food stuffs for the world's population may relieve the many pressures which, today, are holding down the way of life for a large portion of the world's peoples, and by so doing may remove one of the major sources of war.

We may soon be on the verge of discovery of what constitutes muscles, and in time perhaps we shall even be able to make artificial muscles. The mechanism by which muscles function is one of the most interesting and efficient of operations, and perhaps we can learn much that man can apply, by the study of muscular processes.

As yet we do not know how to transfer chemical energy directly into mechanical energy where it can be utilized by man. But we are beginning to make our first inroads into the understanding of such processes. When we know the secret of such processes, it seems not at all impossible that man should be able to improve on nature's process for his own benefit, with enormous aid to mankind.

In the very difficult field of protein chemistry, there has recently been an important break through in man's knowledge, in the field where we study molecules whose weights are in the millions. Only recently there has been produced a model of a reproductive molecule. This gives us, for the first time, an idea of the mechanism of the process by which molecules can reproduce themselves. The knowledge which this brings to the surface is at the basis of medicine, and an understanding of life processes.

We see, too, many new improvements on the horizon in the field of new energy sources, or at least vastly improved energy sources. Of course, all of us will immediately think of atomic energy as the most significant of these new energy sources. There has been much attention paid to this energy source, and for this reason I shall not dwell any more on this topic which has been amply discussed. But solar energy is another promising source at our command, and I think it probable that we may see solar energy come into use sooner, in a practical way, than atomic energy. If we can find methods of utilizing this vast energy from the sun — as yet virtually untapped, except by nature — this achievement will be exceedingly valuable. It is quite possible that we may derive more energy from the sun than exists in our reserves of coal and oil. Moreover, the energy of the sun is inexhaustible, so far as man is concerned, whereas our reserves of coal and oil continually diminish. It seems likely that solar energy can be utilized economically, especially when we recognize that the economics of the problem is merely that of first costs and maintenance costs, and that the energy itself comes to us free.

In another field of energy conversion and utilization, one of your own professors here at the Institute has recently made an important step forward. As yet we can't make chlorophyll — that mysterious substance by which nature converts sunlight into products directly useful to plant life. Moreover, we are far from understanding the process of photosynthesis. But we can now make a solution which will absorb energy in the form of sunlight, and give up this energy at some later time, and this is a significant step forward. Another significant step has recently been made by the Bell Telephone Laboratories in their recent discovery and development of a photoelectrically active surface which converts as much as six per cent of the sunlight falling upon it into useful electrical energy. This is reasonably good efficiency for such an operation. If such surfaces could be built cheaply in large sizes, it would certainly be possible to obtain ample power from the sun.

View of the Hayden Library Court during Alumni Day Symposium, from roof of west wing of the Library.

The field of metallurgy is making great strides and will give us stimulating new materials in the future. Already alloys have been developed which have a tensile strength of a million pounds per square inch. Other metals and alloys having great strength, toughness, or ability to withstand higher temperatures — such as we need in jet engines — will come from our laboratories in time. New materials will undoubtedly come from other fields as well, especially ceramics. Glass fibers have unusually high strength when these are made sufficiently fine; perhaps we can find ways of maintaining this strength in larger sizes. To accomplish this feat, and other equally impressive achievements, we shall have to apply our rapidly expanding knowledge of physics of the solid state. By so doing, we may also be able to make synthetic diamonds. This will probably not be of the variety that the ladies will use for personal adornment, but rather will be used for industrial purposes. Yet, this is by no means an insignificant advance; it will enable us to improve our techniques of mining and thereby considerably improve the utilization of raw materials of the earth's surface.

Rapid developments are taking place in the field of electronics, in large measure, because of progress in transistors. These new devices, which are the only competitors which the electron tube has, are a direct outgrowth of fundamental studies of the physics of the solid state; they were no mere plaything of some attic inventor putting bits of wires and crystals together. The great advantage of the transistor is not alone the fact that it supplements and complements the performance of electron tubes; its exceedingly small power consumption and small size will enable us to employ transistors in many new applications where they serve the needs better than electron tubes, or where large numbers of them must be employed in small spaces, as in computers.

It is interesting to recall that cells of the human brain are called upon to do some of the things which transistors are now doing, but are very much smaller. This leads us to conclude that transistors will be an important factor in the development of more effective analytical machines. When we make extensive use of machines that carry on repetitive and routine operations of calculation, we can assign the non-creative operations to machine manipula-

tions, leaving man free to perform those operations for which his brain is uniquely fitted.

In the early days of technology, the machines which were constructed were simple and often times they were not as reliable as we would have liked. There has long been the feeling that reliability and complexity were incompatible. But we have now reached the point – especially since World War II – where machines can have reliability as well as complexity. In itself, this achievement opens up a vast new field in technology, for it removes some of the restrictions which have bound us.

An important field in which reliability and complexity has not yet had its full impact, is that of storing knowledge of the human race. We must recognize that man began making progress, not when he first used his hands for creative achievements, or when the first wheel or lever was devised, for these discoveries were limited to the accomplishment of single individuals. Man began making real progress only when he learned to write and to record and communicate his knowledge to others. The process of writing, or of storing up information, thus made it possible for him to pass on his experiences to his successors, so that they could benefit from his trials and errors without going through the same errors themselves, and this greatly speeded up progress in man's civilization. Indeed the record of storing knowledge of the human race is essentially the history of mankind. Our progress still depends upon building on the experience of others, but the process of recording, storing, and gaining access to information is becoming tremendously difficult. In fact, we now get bogged down and a great amount of time is wasted by the need to spend many useless hours searching for that small element of knowledge which will enable us to make our own contribution. In many respects, our research workers are approaching a situation comparable to that of the Tower of Babel. The scientist is forced into specialization if he is to make a contribution to existing knowledge. Things have gone so far that workers in the various scientific fields have devised their own type of jargon, so that the world at large is ignorant of what scientists think, or the true meaning of their work. We need to prevent inhibiting our own progress by such encumbering practices.

With the transistor, the magnetic core memory and other elements of recent development, we now have a means for accumulating, storing and gaining access to essential information quickly. The job is by no means yet done, but we begin to see that it can be done, and even how it might be done. In the process of building the necessary storage and access facilities we shall probably learn a great deal about the manner in which the human mind works.

Well, what are the lessons we can learn from this brief review of some of the promising things science has in store for us? For me, the key word is "versatility."

There will be ample opportunity, for those who can move from one area of knowledge into another, to make accomplishments which are very real. The days of the narrow specialist are limited, so far as concerns his ability to make significant, far-reaching contributions. In the development of qualified, well-rounded individuals who are able to work in several fields, there is an opportunity for M.I.T. graduates to lead the procession. There will be much real gratification in carrying on research embracing a variety of disciplines where versatility is a crying need.

But we need also men who will bring together a demand for accomplishment. The man who will lead in the field in the future needs to grasp well affairs covering a wide range of topics – he will not overspecialize. The need is for men having precision of thought, for men who can bring about the changes which they see are on the horizons. But perhaps most of all we need a true understanding of man himself, and the social implication of the things we are doing.

The leaders for the next 20 years will have much opportunity and will face great challenges. Science will not stop, but will ever continually expand in a form which we can hardly grasp or envision at the present time.

Opportunity for Engineering

The very able and highly stimulating address given by Dr. Bush came as a result of intimate knowledge of scientific progress to which many institutions of learning contributed. The comments of the third speaker of the symposium were, appropriately enough, somewhat more intimately associated with engineering progress going on at M.I.T. Accordingly, when Dr. Compton introduced Admiral Edward L. Cochrane, Dean of Engineering, the address on "The Opportunity for Engineering" covered essentially the material recorded herewith.

The decade just past has been a short one – or so it seems – and yet when measured in terms of world accomplishment it has been both encouraging as well as discouraging. It has been a wonderful decade as measured by engineering accomplishments, and we can recite many achievements to prove this statement. In the field of human relations, however, we need much better instruments than are now available to detect progress. Two barometers of progress are available at the moment; one in Washington and one in Geneva and neither predicts as fair weather as might be desirable. But we must recognize that nations are but organizations of men, and that what we see in the national or international scene is but a magnified reflection of what happens to us and what actions we take as individuals; our shortcomings as well as our strength are reflected. In retrospect the past decade seems to be ominous, but I feel no compulsion, on an occasion of this kind, to make dire predictions. And, if Senate Committees can break ground rules, so can we. Accordingly, I propose to set up three ground rules.

The first of these ground rules is our declaration that there shall be "no wars." The second is that we should, as we say in the Navy, "keep a bright lookout to windward." Now, of course, that is an old expression coming to us from days of the sailing ships, but I think it indicates the point of view I wish to bring to your attention. So, for the rest of my talk, I plan to table any idea of a war in the near future and base my predictions on the assumption that we shall conduct our work under conditions of an armed truce, if not of peace.

Of course engineering progress is greatly accelerated by the demands of wartime, and we have made tremendous progress under wartime needs. But it is equally obvious that the same goals of engineering achievement could be made without war. As examples of wartime progress, the great surge of electronic developments, including many types of radar – sometimes more types than I could find room for on my ships, and more than I could ever learn about – came out of World War II. So too did many synthetics. Out of the Manhattan Project with the A bombs that exploded over Hiroshima and Nagasaki, came two children which are destined to exceed the parent in size and ability. One of these is the H-bomb, which I shall discuss no farther; it is plainly the "ornery" child of the parent. The other, nuclear energy, is a lad of great promise to mankind, and from whom we may expect a bright future. Nuclear energy was first

(*Continued on page 484*)

A Report on

Commencement and Alumni Day

TRADITIONAL in many respects were the events of Senior Week, culminating in commencement exercises on June 11, and of Alumni Day, June 14. Still, the affairs marking the close of the current school year were denoted by a sufficient number of innovations – and even one or two unique features – as to be worthy of special emphasis.

Possibly presaging an era in which the distaff members will give new meaning to the Institute's ever present co-educational activities, it can be reported that the 21 women who received degrees this June – including four who took Ph.D. degrees – represented the largest class of women graduates in the Institute's history. As if to lend emphasis to this achievement, the Ladies Banquet, at which Mrs. Karl T. Compton was the honored speaker, was the largest of its kind in M.I.T. history. Another unique feature of Alumni Day was that the nation-wide Civil Defense alert occurred on June 14, just as activities at the registration desk were reaching their peak.

The symposium, "The Next 10 Years," which took place on the morning of Alumni Day, renewed a highly successful practice of former years. By offering Technology Alumni opportunity of listening to internationally known leaders in science, engineering, and management, in a discussion of current trends in these fields, the symposium added an educational incentive to the purely social reasons for coming back to Tech on Alumni Day. Nor must we overlook, in our recital of unique events, the publication, on Alumni Day, of a significant volume on the early history of the Institute, by Samuel C. Prescott, '94.

Through an unusual concatenation of events, The Technology Review faced an unprecedented challenge in gathering, reporting, and generating copy for this final issue of the volume, as might be inferred from the unusually small number of signed articles for a July issue. In the task of gathering copy for this issue of The Review, it is a pleasure to acknowledge the wholehearted co-operation which was rendered by the Institute's News Service and especially by the Lowell Institute Co-operative Council, whose transcriptions greatly facilitated publication of a number of addresses.

The events associated with the close of the M.I.T. school year are recorded in the following pages in their chronological sequence.

Senior Week Events

As usual, the graduates had a week of activities in conjunction with commencement, beginning with the Senior Stag Banquet held in Rockwell Cage at 6:30 P.M. on Friday, June 4. The following day, the Class Party and Carnival was held at Walker Memorial at 8:00 P.M. On Monday, June 7, the annual senior ball was held at the Hotel Statler, and the following evening members of the senior class went on a moonlight cruise.

On Thursday, June 10, R.O.T.C. students received their commissions in the morning and in the afternoon graduates gathered on the steps of Building 10 at 2:15 for their class picture, and then to march to the baccalaureate service held at Walker Memorial at 3:00 P.M.

R.O.T.C. Commissioning Exercises

The commissioning exercises of the Reserve Officers' Training Corps of the United States Army and the United States Air Force were opened with the Needham High School Band playing the General's March. The invocation was given by Rabbi Herman Pollack. Colonel Glenn C. Coleman, Professor of Air Science at M.I.T., made the introduction of Dr. Compton and other distinguished guests. Brigadier General Ralph W. Zwicker, U.S.A. Commanding General, Camp Kilmer, and Brigadier General Kurt M. Landon, U.S.A.F. Chief of Staff, Air Research and Development Command, presented commissions for the Army and Air Force, and the Oath of Office was administered to the 143 young men receiving commissions by Colonel Charles M. McAffee, Professor of Military Science and Tactics at M.I.T. Father J. Edward Nugent gave the benediction and the exercises were concluded with the Needham High School band playing the national anthem.

About to enter Rockwell Cage for commencement exercises are, (in usual reading order): James R. Killian, Jr., '26, President of M.I.T., Clarence B. Randall, Chairman of the Board of Inland Steel Company, who gave the commencement address, and Karl T. Compton, Chairman of the M.I.T. Corporation.

Commencement Day luncheon was held under canvas in the Great Court. Those at the head table were (in usual order): Nolan T. Jones, '54, Mrs. Nolan T. Jones; Professor Gordon B. Wilkes, '11, who becomes Professor Emeritus; Mrs. Gordon B. Wilkes; Dr. Godfrey L. Cabot, '81; Ralph Lowell; Vannevar Bush, '16; Karl T. Compton; Mrs. Clarence B. Randall; and President Killian.

Baccalaureate Service

The baccalaureate service of the Class of 1954 was held at Walker Memorial at 3:00 P.M. on Thursday, June 10. Philip M. Richardson, '26, at the organ, rendered the prelude and, as processional, the "Solemn March" by Felix Mendelssohn. Call to worship was given by Dean E. Francis Bowditch, and the audience sang the hymn "For the Beauty of the Earth" by Conrad Kocher with lyrics by Folliott S. Pierpont. President James R. Killian, Jr., '26, gave the reading which consisted of text from *Proverbs* 3:13-23, and extracts from "The University" by John Masefield. Under the leadership of Klaus Liepmann, the M.I.T. Choir sang "Chorale and Kyrie" by Johann Sebastian Bach.

The baccalaureate address, "The Pleasures of Learning" was delivered by Gilbert Highet, Professor of Greek and Latin at Columbia University. A prayer was given by Dean Bowditch, and the M.I.T. Choir sang the "Hallelujah Chorus" from "Mount of Olives" by Beethoven, Dean Bowditch gave the benediction, and the ceremonies closed with the recessional march, "*Marche Religieuse*" by Joseph Jongen.

Commencement Exercises

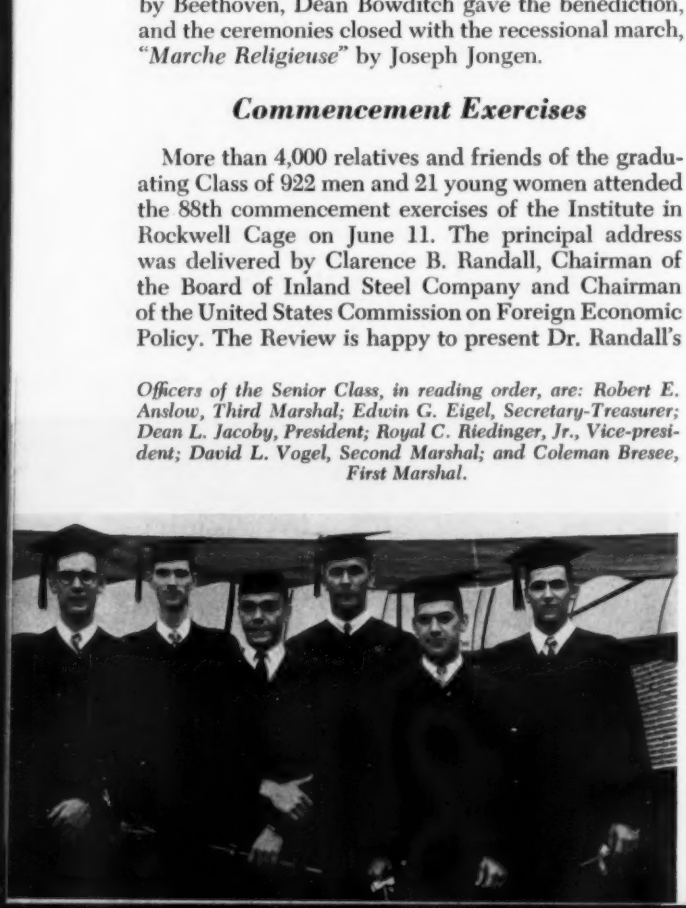
More than 4,000 relatives and friends of the graduating Class of 922 men and 21 young women attended the 88th commencement exercises of the Institute in Rockwell Cage on June 11. The principal address was delivered by Clarence B. Randall, Chairman of the Board of Inland Steel Company and Chairman of the United States Commission on Foreign Economic Policy. The Review is happy to present Dr. Randall's address, "The Educated Man" to its readers (page 461). President Killian made the traditional address to the Class and personally awarded the degrees. Julius A. Stratton, Provost, and Walter H. Gale, Secretary of the Institute, were Investors of the Hood.

Commencement exercises opened with the academic procession of graduates, guests of honor, members of the M.I.T. Corporation, Alumni of the 50-year Class of 1904, officers of the 25-year Class of 1929, and members of the Faculty. Chief Marshal Horatio L. Bond, '23, President of the Alumni Association, led the procession and Karl T. Compton marched at the head of the Guests of Honor Division. Walter Humphreys, Secretary of the Corporation, was Marshal of the Corporation Division, and Currier Lang was Marshal of the Class of 1904. Marching at the head of the Class of 1954 were the class officers and marshals whose pictures appear below.

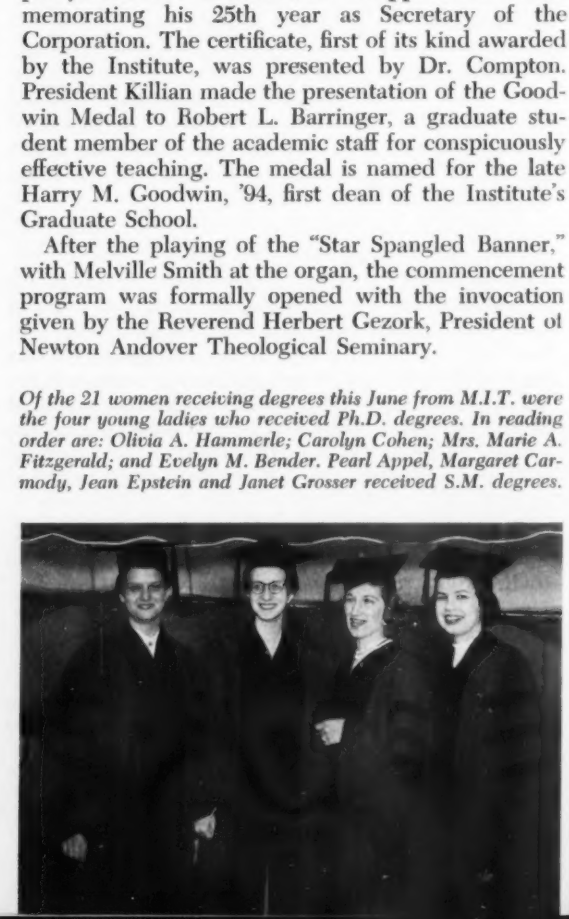
In an unusual and unlisted ceremony, Walter Humphreys received a certificate of appreciation commemorating his 25th year as Secretary of the Corporation. The certificate, first of its kind awarded by the Institute, was presented by Dr. Compton. President Killian made the presentation of the Goodwin Medal to Robert L. Barringer, a graduate student member of the academic staff for conspicuously effective teaching. The medal is named for the late Harry M. Goodwin, '94, first dean of the Institute's Graduate School.

After the playing of the "Star Spangled Banner," with Melville Smith at the organ, the commencement program was formally opened with the invocation given by the Reverend Herbert Gezork, President of Newton Andover Theological Seminary.

Officers of the Senior Class, in reading order, are: Robert E. Anslow, Third Marshal; Edwin G. Eigel, Secretary-Treasurer; Dean L. Jacoby, President; Royal C. Riedinger, Jr., Vice-president; David L. Vogel, Second Marshal; and Coleman Bresee, First Marshal.



Of the 21 women receiving degrees this June from M.I.T. were the four young ladies who received Ph.D. degrees. In reading order are: Olivia A. Hammerle; Carolyn Cohen; Mrs. Marie A. Fitzgerald; and Evelyn M. Bender. Pearl Appel, Margaret Carmody, Jean Epstein and Janet Grosser received S.M. degrees.



Continuing with those at the head table at the Commencement Day luncheon, left to right, are: Mrs. Karl T. Compton; Clarence B. Randall, Commencement Day Speaker; Mrs. James R. Killian, Jr.; Carle R. Hayward, '04; Mrs. Carle R. Hayward; John B. Babcock, '10, who becomes Professor Emeritus; Mrs. Horatio L. Bond; Horatio L. Bond, '23; and Dean L. Jacoby, '54.

Commencement Day Luncheon

Since the discontinuance of Class Day activities several years ago, the open air luncheon on Commencement Day has, in some measure, been the means for recognizing the recent graduates as new Technology Alumni; it has also provided opportunity for members of the Faculty and representatives of the Alumni Association to join families and friends of the graduates on a happy and auspicious occasion.

A buffet luncheon was served, under canvas, in Du Pont Court as well as in an adjoining portion of the Great Court where tables for the speakers and honored guests were located.

Upon conclusion of the informal luncheon, President Killian paid special tribute to the Class of 1904 who had gathered to celebrate the 50th anniversary of their graduation from the Institute. Since the Class of 1904 had left the Institute a month before he was born, Dr. Killian professed a particularly close affection and kinship for this Class. In a review of some of the more important contributions which members of the Class of 1904 had made, President Killian recalled with pride the fact that Dr. A. C. Willard had served as President of the University of Illinois, whereas two other members – Henry T. Kalmus and E. Wastcoat – had developed an important process of color photography and had honored their *Alma Mater* by naming this process "Technicolor." Commenting upon conditions at the time the 50-year Class left the Institute, President Killian recalled – thereby giving evidence of an extraordinarily good memory – that a great debate was going on in 1904, regarding the desirability of a union of M.I.T. and Harvard. Such a merger would combine the very considerable financial resources of Harvard with the outstanding science and engineering faculty and facilities of the Institute.* Members of the Class of 1904 were opposed to the merger, and Dr. Killian took opportunity to praise the Class for its loyalty and support of M.I.T.'s independence throughout the past half century. As Reunion Chairman, Carle R. Hayward, '14, Professor Emeritus, was then called on by Dr. Killian.

Expressing appreciation at the honor of being able to speak on the occasion, Professor Hayward spoke of the great advances that had been made in technology in the past half century. He illustrated this progress by relating the story of a student who had recently asked Warren K. Lewis, Professor Emeritus, for admission in the Course in Chemical Engineering. In the conversation, the student thought to support his case by reminding Professor Lewis that he had taught his father a quarter century back. This brought forth the comment from Dr. Lewis: "Tell your father we can teach you in three weeks all that was known about chemical engineering when he was a student." Professor Hayward expected the Class of 1954 to do better work than the Class of 1904 had done, because they will be better equipped and have better tools, but he doubted that they would have any more fun than the half century class.

Recognizing that the fame of the Institute is based on its accomplishments in the application of science, Professor Hayward expressed the hope that the trend of applied science would be continued, since it is the application of knowledge that makes for better living, especially knowledge of the physical and medical sciences.

Dean L. Jacoby, President of the graduating Class during his senior year, and permanent President of the Class of 1954 was then asked to speak. He stated that he felt his Class was entering a zone of uncertainty; his classmates no longer were undergraduates but neither had they had opportunity to regard themselves as full-fledged Technology Alumni. He also stated that the members of his Class had a deep feeling of pride in their progress at the Institute.

Informal group at the Alumni Day luncheon, held under canvas in Du Pont Court.

*This phase of the Institute's history is admirably recorded in the recently published volume *When M.I.T. was "Boston Tech"* by Samuel C. Prescott, '94, and published by The Technology Press.

With an attendance of approximately 170, the Ladies Banquet at the Hotel Statler, was the largest of its kind on record. At the speaker's table (left to right) are: Mrs. D. W. Kitchin; Mrs. Theodore T. Miller; Mrs. Horatio L. Bond; Mrs. James R. Killian, Jr.; Mrs. E. P. Brooks; Mrs. Karl T. Compton who told of her recent visit to Haifa; Mrs. William B. Given; Mrs. Hugh S. Ferguson; and Mrs. Avery H. Stanton.

President Killian then introduced two members of the Faculty who reached the emeritus status this year – John B. Babcock, 3rd, '10, and Gordon B. Wilkes, '11 – both of whom have been associated with the Institute's teaching almost since their graduation from M.I.T. Brief biographies of these two well-known professors appeared on page 409 of the June issue of The Review.

In his usual unassuming and friendly manner, Dr. Compton made a few informal remarks to the graduates and their friends assembled. He stated his belief that a good college or university is "a corner in men's hearts where hope lives." He expressed evident satisfaction that this should be so, for the younger generation will be expected to carry on the world's work, and the young college graduates, especially, represent the flow of hope for the future. Then, as he had done on many similar occasions in the past, he wished members of the graduating class Godspeed in the work that awaited them.

President Killian concluded the luncheon addresses by recalling a greeting President Pritchett had given to the Class of 1904 upon its graduation. Like President Pritchett, Dr. Killian wished the graduates a career of useful service in which the Institute would take much pride.

Upon the conclusion of the luncheon, President and Mrs Killian, Dean and Mrs. Bowditch, and Dean L. Jacobs, '54, met with relatives and friends of the graduates in a reception which the camera captured as shown on page 456.

Reunion of Class of 1929

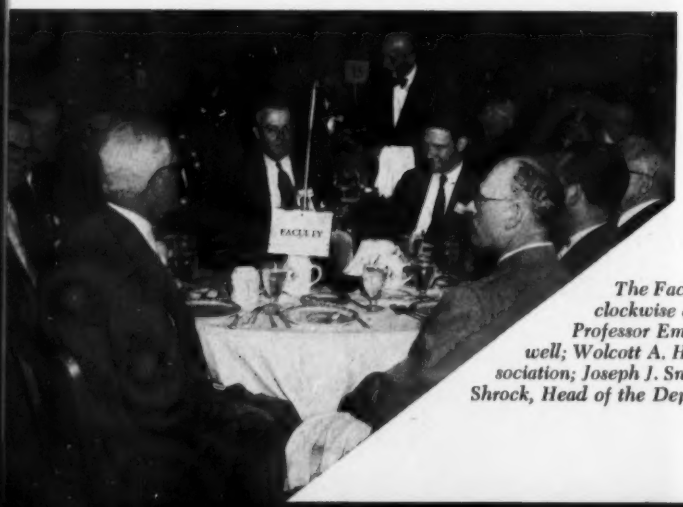
Following the precedent established last year the Class of 1929 held its 25th year reunion "back at Tech" from Friday, June 11 to Monday, June 14. Baker House was the headquarters of the reunion and it accommodated all who wished to take part in on-campus activities. Friday was given over to registration, swimming, buffet dinner and dancing.

Events on Saturday began with cafeteria breakfast and tours of M.I.T. for families and friends. At 1:00 P.M. Morss Hall in Walker Memorial was the scene of the Faculty luncheon with members of the 25-year Class. Continuing the pleasant precedent of last year, those members of the Faculty who were present 25 years ago – as well as a few of the more recent members of the M.I.T. family – were guests of the Class of 1929 at the informal luncheon. As master of ceremonies, C. Brigham Allen paid generous tribute to those who had organized the reunion, and presented a gift of appreciation to Mr. and Mrs. Walter H. Gale. President Killian and Dr. Compton both spoke briefly and brought greetings from the Administration and the Corporation. Erwin H. Schell concluded the luncheon with an address "A Place For Gladness."

Following the luncheon the class picture was made of Alumni and their wives and children on the steps of Walker Memorial, and a water carnival in the Alumni Swimming Pool ended the afternoon events. In the evening, the schedule called for dinner and attendance at the Pops Concert in Symphony Hall.

Sunday was given to shore dinner, swimming, and sightseeing at Castle Hill (near Newburyport, Mass.) with a buffet supper once again at Baker House on the M.I.T. campus, followed by informal relaxation and entertainment. Monday, the Class took part in usual Alumni Day events.

Of the approximately 125 members of the Class of 1929 to return to Tech, Sadik A-H. Baroudi set probably the long distance record. He flew from Hama, Syria, to attend the 25-year reunion.



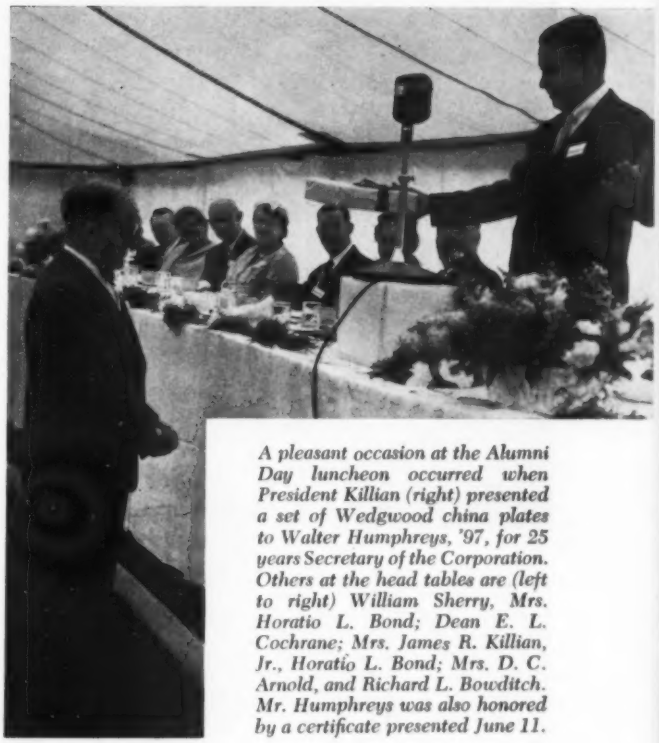
The Faculty was well represented, as usual, at the Alumni Day banquet. In clockwise order, from opening in foreground, are: James W. F. MacDonald; Professor Emeritus Walter C. Voss, '32; Delbert H. Rhind; Frederick G. Hartwell; Wolcott A. Hokanson, who was made an Honorary Member of the Alumni Association; Joseph J. Snyder, 2–44; Horace S. Ford; Dean Thomas T. Pitre; and Robert R. Shrock, Head of the Department of Geology.

Meeting of Honorary Secretaries

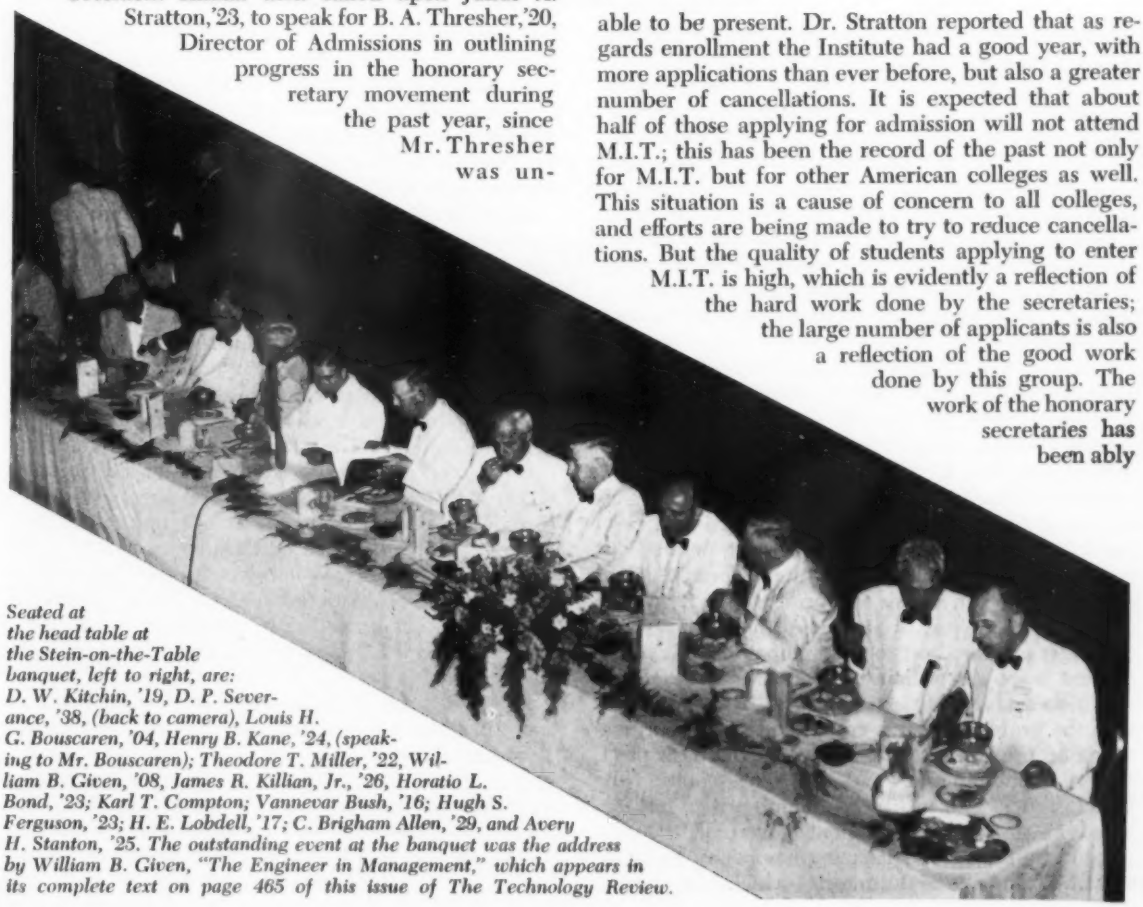
The honorary secretaries and educational counsellors met at the Faculty Club at 5:30 P.M. on Sunday, June 13, for a business meeting and annual dinner. In the largest meeting of its kind 135 members and representatives of the Institute's staff took part. As last year, there was no afternoon session devoted to open discussion, but members of the council who had special problems could consult individually with M.I.T. personnel who were available for the purpose.

At the conclusion of the dinner President Killian called upon Dr. Compton, who enumerated some of the many contributions made to M.I.T. by Redfield Proctor, '02, Governor of Vermont in 1923-1925, and member of the M.I.T. Corporation for 30 years. For many years Mr. Proctor had felt it desirable for M.I.T. to have a Faculty Club and he supplied funds to be used for this purpose at the appropriate time. When the Sloan Building was purchased, the "appropriate time" was thought to have arrived and the Faculty Club was established. As evidence of his interest in the exchange of students between foreign countries, Mr. Proctor also established the Redfield Proctor Travelling Fellowships, of which James B. Fisk, '31, the Bell Telephone Laboratories was one of the early recipients. At this point, Dr. Compton unveiled a portrait of Redfield Proctor painted by Gardner Cox '32, a graduate of the course in architecture.

President Killian then called upon Julius A. Stratton,'23, to speak for B. A. Thresher,'20, Director of Admissions in outlining progress in the honorary secretary movement during the past year, since Mr. Thresher was unable to be present. Dr. Stratton reported that as regards enrollment the Institute had a good year, with more applications than ever before, but also a greater number of cancellations. It is expected that about half of those applying for admission will not attend M.I.T.; this has been the record of the past not only for M.I.T. but for other American colleges as well. This situation is a cause of concern to all colleges, and efforts are being made to try to reduce cancellations. But the quality of students applying to enter M.I.T. is high, which is evidently a reflection of the hard work done by the secretaries; the large number of applicants is also a reflection of the good work done by this group. The work of the honorary secretaries has been ably



A pleasant occasion at the Alumni Day luncheon occurred when President Killian (right) presented a set of Wedgwood china plates to Walter Humphreys, '97, for 25 years Secretary of the Corporation. Others at the head tables are (left to right) William Sherry, Mrs. Horatio L. Bond; Dean E. L. Cochrane; Mrs. James R. Killian, Jr., Horatio L. Bond; Mrs. D. C. Arnold, and Richard L. Bowditch. Mr. Humphreys was also honored by a certificate presented June 11.



Seated at the head table at the Stein-on-the-Table banquet, left to right, are: D. W. Kitchin, '19, D. P. Severance, '38, (back to camera), Louis H. G. Bouscaren, '04, Henry B. Kane, '24, (speaking to Mr. Bouscaren); Theodore T. Miller, '22, William B. Given, '08, James R. Killian, Jr., '26, Horatio L. Bond, '23; Karl T. Compton; Vannevar Bush, '16; Hugh S. Ferguson, '23; H. E. Lobdell, '17; C. Brigham Allen, '29, and Avery H. Stanton, '25. The outstanding event at the banquet was the address by William B. Given, "The Engineer in Management," which appears in its complete text on page 465 of this issue of The Technology Review.

(Left.) Members of the Class of 1929 made a good showing at the Alumni Day banquet which brought to a close their 25 year reunion. Shown at one of the '29 tables are (in clockwise order): Jerome Palmer, James Fahey; Raymond Underwood; Carl M. F. Peterson; William Harris; and Hemenway Bullock. Eric Bianchi and Frank Pierson, also at this table, are not shown in the photograph.

(Right) Having a favored position at the foot of the head table at the Alumni Day banquet was the '94 to '96 table. In clockwise order from foreground opening are: S. P. Hunt, '95, S. C. Prescott, '94, H. F. Copeland, '94, N. S. Bean, '94; Dr. J. A. Rockwell, '96; F. W. Damon, '96; R. A. Davis, '96; J. M. Driscoll, '96 (not shown); A. H. Sparr, '96, and E. M. Hunt, '96

supplanted this year as 12 members of the Faculty visited secondary schools throughout the country.

Dr. Killian next asked Arthur L. Bryant, 10–44, Executive Secretary of the Educational Council, to report on the work of his group, since the fall of 1951. By June, 1952, said Mr. Bryant, there were 292 honorary secretaries and 95 educational counsellors, or 387 active counsel members. By June of 1953, there were 192 counsellors, and this year we have 282 educational counsellors. This group of ambassadors for M.I.T. now covers 85 different areas in 36 states, in Washington, D. C. and in Hawaii, and works with 654 schools.

President Killian also announced the awards that had been made of the Compton Prizes (see page 479 for details) and then asked Dean L. Jacoby, '54, President of the Senior Class, to report on the major student activities for the past year.

Dean Jacoby spoke at some length on the reorganization of the Institute Committee which had been put into effect during the past year. He pointed out that for many years the Institute Committee had been organized on a basis of representation from each of the major activities at M.I.T. but that such division no longer appears best to represent the needs of the student body. Accordingly, the Institute Committee established an Activities Counsel to deal specifically with the problems of this group, and made representation on the Institute Committee on the basis of (1) course representation, and (2) representation by living groups. The Institute Committee also has matured in treatment of student government, as indicated by the fact that hazing has been eliminated at M.I.T. Damage to dormitories which was done by students a year ago, and amounting to $1210, was paid for last year by the students through a special assessment for this purpose. It is believed that such acceptance of responsibility for student affairs, even though necessitating some unpopular measures on the part of student government, indicates a more mature attitude than has been evident in the past.

Mr. Nolan Jones was then asked to speak on the formation and activities of the Graduate Student Council. This Council is composed of representatives from the various courses or professions, in addition to one from each living group. This year the Council published the *Graduate Student News*, a newspaper, which has done much to bind graduate students together. In addition, the Council has made serious efforts to provide warm welcome to incoming foreign graduate students. The Graduate Student Council has also selected a class ring and (as recorded on page 355 of the May issue of The Review) now has a structure of classes comparable to that of undergraduates. In this way it is believed that graduates who have no prior undergraduate affiliation with the Institute as Alumni, will be made to feel a greater loyalty to M.I.T. than has been true in the past.

Norman Dahl, Chairman of the Undergraduate Committee, spoke on the recent changes in M.I.T. policy which have been put into effect to create a more personal relationship between the Institute and freshman students.

Finally, Dr. Killian announced that Werner Schoop of Zurich, Switzerland, and Robert L. Moody of Sao Paulo, Brazil, seemed to have come the greatest distance, and he asked each to speak briefly.

(*Continued on page 494*)

THE INSTITUTE GAZETTE

PREPARED IN COLLABORATION WITH THE TECHNOLOGY NEWS SERVICE

Kimball Appointed Secretary

THE appointment of Robert M. Kimball, '33, as Secretary of the Institute was announced June 20 by President James R. Killian, Jr., '26.

Mr. Kimball succeeds Walter H. Gale, '29, Associate Professor of Aeronautical Engineering, who has asked to be relieved of administrative duties to devote full attention to plans for future development at the Institute. In making the announcement of Mr. Kimball's new appointment, Dr. Killian stated:

> M.I.T. is fortunate in securing Mr. Kimball for this important administrative post. His variety and breadth of experience, his extensive knowledge of M.I.T. affairs, and his sound administrative judgment make me very happy to have him more closely associated with my office as he will be.

In his new post, Mr. Kimball will work with the Secretary of the M.I.T. Corporation and its committees to further major new undertakings of the Institute. He will have special responsibility for relationships with the various departmental Visiting Committees and for the Committee on Development. Professor Gale will also continue a close association with these projects.

Mr. Kimball brings many years of experience in scientific and educational administration to his new duties. He has been director of Business Administration at M.I.T. since 1950; earlier he served as executive assistant to the President, personnel officer, and as a member of the Registrar's and Admission Offices.

Robert M. Kimball, '33, newly appointed secretary of the Institute.

Between 1948 and 1950 Mr. Kimball, on leave from M.I.T., was administrative associate director of the Los Alamos, New Mexico, Laboratory of the Atomic Energy Commission. He was graduated from M.I.T. in 1933, after attending Phillips Academy at Andover for two years.

Professor Gale, a resident of Melvin Village, New Hampshire, became secretary of the Institute when that post was created in May, 1951, after serving for several years as director of M.I.T.'s Summer Session. He graduated in aeronautical engineering from M.I.T. in 1929; from 1935 to 1945 he held engineering positions in the aircraft industry and government research laboratories before returning as associate professor of aeronautical engineering.

Lowell Institute Commencement

ROBERT J. Short, Chief Engineer of the Procter and Gamble Company in Cincinnati, delivered the principal address at the fiftieth graduation exercises at the Lowell Institute School at the Massachusetts Institute of Technology on May 27.

Ralph Lowell, President of the Boston Safe Deposit and Trust Company and sole trustee of the Lowell Institute School, awarded certificates to about 100 graduates, one of whom was Mrs. Robert Davisson of 19 Middle Street, Waltham, the first woman ever to be graduated from the School.

Karl T. Compton, Chairman of the M.I.T. Corporation, spoke on behalf of M.I.T., and Nils Y. Wessell, President of Tufts College, brought greetings from the other educational institutions in the metropolitan area.

The Charles Francis Park Medal, which bears the name of the first director of the School and is awarded for excellence in the course, was presented to Vernon E. MacRoberts, who is a graduate of Whitman High School and is employed as an electronics technician in the Department of Electrical Engineering at M.I.T. The citation accompanying the Park Medal was read by Edward R. Sears, a graduate of the Lowell Institute School with the Class of 1911. Arthur L. Townsend, '13, Director of the Lowell Institute School and Associate Professor of Mechanical Engineering at M.I.T., presided.

The Lowell Institute School was established in 1903 under the auspices of the Lowell Institute Foundation to enable men working in industry to take evening instruction in technical subjects.

Students in the School come from large corporations, from engineering offices, and from small machine shops and manufacturing plants. They come from everywhere in the Boston area and represent an impressive variety of trades and occupations. The curriculum, which began with mechanical and electrical courses, has increased in content and intensity over the years. A building course was added in 1913, and in 1923 the School began to add advanced courses in special fields.

Technology's sailors, including (left to right) Horacio A. Garcia, '54, skipper, John H. Reiman, '54, Jorge Diena, '54, and Alain deBerc, '55, won the National Intercollegiate Sailing Championship for the Henry Adams Morss Memorial Bowl held at Newport Harbor, Calif., June 15-18. It was the eighth championship of the 18 events sailed since it was inaugurated in 1937 which has been captured by M.I.T. sailors, and climaxed a season in which Technology sailors divided honors for principal trophys with sailors from Harvard.

Following this victory, sailors from Harvard and M.I.T. representing the New England Intercollegiate Sailing Association. successfully defended the Sir Thomas Lipton Memorial Trophy, emblematic of the team racing championship of North America.

Tech Sailors and Crew Take Championships

On July 3, the M.I.T. crew won the Thames Challenge Cup by defeating a British Royal Navy Crew by two and one-half lengths at Henley-on-Thames, England, during the Royal Henley Regatta. This victory for the crew came shortly after M.I.T. sailors had won, from Harvard University, the National Intercollegiate Sailing Championship for the Henry Morss Memorial Bowl at Newport Harbor, Calif., during June 15 to 18. Tech and Harvard sailors then teamed up to represent the New England Intercollegiate Sailing Association and successfully defended the Sir Thomas Lipton Memorial Trophy against challenges from Midwest and Pacific Coast sailors. Those who regard the Institute as an educational institution lacking in sports, are decidedly behind the times in their thinking.

In rainy weather, in which fitful gusts of wind made the Thames choppy, President Killian, on academic business in England, saw the Technology crew cover the one mile 550 yard course in seven minutes and 24 seconds, at the close of preliminary races in which the cardinal and gray was the only crew representing the United States. In fact, the United States almost dropped out of the race on the first day of the Royal Henley Regatta as crews of St. Paul's School of Concord, N.H., of the Ivy Club of Princeton, and of the Yale University Boat Club bowed to British crews.

At the finish of the Henley races, as the M.I.T. crew won over 72 competitors, coxswain Jerome D. Waye, '54, was tossed into the river in the traditional manner. Coach Jack Frailey, who trained the crew, was similarly treated.

The Institute's Director of Athletics, Ivan J. Geiger, flew to England with members of the M.I.T. crew. Upon his return he brought with him the Thames Challenge Cup which has added new luster to the President's Office, where it has been residing since early in July.

Athletic Awards

Two top athletic awards were made at an all-Institute convocation at the Institute on May 14. Recipients were Joseph P. Bova, Medford senior, who received the Class of 1948 trophy, and the Theta Chi Fraternity, which received the Beaver Key trophy.

Bova has been the Tech goalie in both hockey and lacrosse since his sophomore year and is a three-year letterman in each sport. The trophy he received is awarded annually to the member of the senior class who has best exemplified through athletics, traits of leadership and character. He was also judged outstanding in progression and achievement. The trophy was presented by Benjamin L. Averbach, who is this year Chairman of the Athletic Administration Board.

Three other members of the Class of 1954 were given honorable mention for the award. They were Edmundo Garcia, outstanding sailor and retiring student commodore, William H. McTigue, Jr., lightweight crew captain and Paul Rudzinski, captain and number one squash player for the past three years.

The Theta Chi Fraternity received the first Beaver Key trophy for their over-all record of participation in intercollegiate sports. The award was made on the basis of a participation-point scale patterned after the athletic department's point system and administered by Beaver Key, M.I.T. junior class honorary society and donor of the trophy. It was presented by Richard P. Toohy, '55, President of Beaver Key.

Goodwin and Compton Awards

ROBERT L. Barringer, a teaching assistant in physics at the Institute, received M.I.T.'s Goodwin Award for conspicuously effective teaching, at an all-student convocation on May 14.

A native of Lakewood, Ohio, Mr. Barringer received his bachelor's degree in physics from The Principia College (near Alton, Ill.) in 1951. He entered the M.I.T. graduate school as a candidate for the doctorate in physics in September, 1951, and was appointed teaching assistant in February, 1952.

The Goodwin award is named in memory of Harry Manley Goodwin, first Dean of M.I.T.'s Graduate School, and is granted to a member of the M.I.T. instructing staff who is studying for an advanced degree at the Institute. Although the award may be made annually, it is given only for unusually effective teaching.

The first M.I.T. Compton Awards were also made at the same convocation. Established by the Boston Stein Club, the awards are named in honor of Karl T. Compton, Chairman of the Board at the Institute. They are given in recognition of outstanding contributions by students in promoting high standards of achievement and good citizenship within the Institute.

Recipients were Charles J. Masison, Jr., '54, Austin Whillier, Sc.D., '53, and the Institute Committee, the undergraduate governing body at M.I.T.

Masison is a graduate of The New Preparatory School of Cambridge. As chairman of the Dormitory Committee during the current academic year, he has been responsible for the effective co-ordination of all the undergraduate dormitory groups at M.I.T. He also organized the dormitory leadership conference, was responsible in large measure for the Institute Christmas program, and participated in the Institute Committee leadership conference, the Institute Committee reorganization and the Freshman Advisory System.

Mr. Whillier is a native of the Orange Free State Union of South Africa, and received his doctor of science degree in mechanical engineering at M.I.T. last June. While a graduate student at M.I.T., he worked for an effective graduate student governing body and wrote the first proposed constitution of what is now the new Graduate Student Organization. He was also one of the originators of the M.I.T. rugby team and has worked effectively for a closer relationship between graduate degree alumni and the Institute through the Alumni Association. This closer relationship has begun to come into being over the past year.

The Institute Committee, the undergraduate governing body at M.I.T., received the group Compton award for its contributions to effective communication at the Institute and for its recent reorganization of student government. The certificate of award presented to the Institute Committee read as follows:

"During the past year it has exhibited high qualities of intelligence, independence, responsibility and courage, and through its actions in effecting its own reorganization and improving communications with, and understanding by, other members of the Institute community it has earned the respect of students and faculty alike."

Hunsaker Professorship

GIFTS totalling $275,000 to the Massachusetts Institute of Technology to establish a professorship in aeronautical engineering honoring Jerome C. Hunsaker, founder and for many years head of the Department at M.I.T., was announced June 14 by James R. Killian, Jr., '26, President.

A distinguished aeronautical specialist is being invited to be the first Jerome C. Hunsaker Professor of Aeronautical Engineering, Dr. Killian told Alumni at their annual luncheon. The present $275,000 endowment for the Professorship, received from many donors throughout the aircraft industry, is expected to be increased to $500,000 by subsequent gifts, he said. "This fund," Dr. Killian continued, "is a magnificent example of the kind of support which all private educational institutions must have to maintain their high standards of education supported by pioneering research studies."

Professor Hunsaker, who is honored by the Professorship, came to M.I.T. in 1909 as a graduate student, after graduating from the U.S. Naval Academy at Annapolis. After a survey of European aeronautics in 1913, he organized at M.I.T. the first course in aeronautical engineering in the United States which since then has graduated many of the nation's leading military, naval, and industrial aeronautical engineers. When the Department of Aeronautical Engineering was created at M.I.T. in 1939 he became its head, a post which he held until his retirement in 1952.

In 1916 Dr. Hunsaker was called to active duty with the Navy, to take charge of the Aircraft Division of the Bureau of Construction and Repair. In this post he supervised the design of the NC-4, the first aircraft to fly the Atlantic, and the airship *Shenandoah*. For his design work in World War I Professor Hunsaker received the Navy Cross. Other honors have included the Daniel Guggenheim Medal (1933), the Franklin Medal (1942), the Presidential Medal for Merit (1946), the French Legion of Honor (1949), and the Wright Brothers Memorial Trophy (1951). He has been a member of the National Advisory Committee on Aeronautics since 1923 and its chairman since 1941.

In announcing the Jerome C. Hunsaker Professorship today, Dr. Killian named seven Alumni of the Institute who have been instrumental in establishing this new fund. They are: Major General James H. Doolittle '24, Vice-president of the Shell Oil Company; Donald W. Douglas '14, Chairman of the Board of the Douglas Aircraft Company; Rear Admiral Luis de Florez, '11, President of the de Florez Engineering Company, Inc.; Major Lester D. Gardner, '98, Former President of Aeronautical Archives; Leroy R. Grumman, Chairman of the Board of Grumman Aircraft Engineering Corporation; Vice Admiral Edwin H. Land, Chairman of the Board of Polaroid Corporation; and Edward P. Warner, '17, former member of the Civil Aeronautical Board.

In recognition of his loyal and faithful service to M.I.T. and his many contributions to the Institute, including aid in raising funds for the Hunsaker Professorship, the Institute has set up a scholarship fund of $50,000 honoring Major Lester D. Gardner.

Roundup

MEETING for the last time for the current season, 132 members and guests attended the 304th meeting of the Alumni Council on May 24. President Horatio L. Bond, '23, called the dinner meeting at the M.I.T. Faculty Club to order at 8:05 P.M. for a fairly long business session at which the year's activities were summarized in several reports.

As Secretary for the Association, Donald P. Severance, '38, announced that between March 22 and May 24 visits had been made to 10 alumni clubs by 11 members of the Institute family. Changes in class affiliation for 15 Alumni were approved, and class representatives on the Alumni Council for classes whose numerals end in 5 or 0 were announced.

It was also reported that earlier in the day the Executive Committee had voted recognition of the M.I.T. Club of São Paulo, whereas recognition was withdrawn from the M.I.T. Club of Shanghai. The Executive Committee also voted to submit nominations for committee personnel for Council consideration, and to the election of Wolcott A. Hokanson as an Honorary Member of the Alumni Association.

As Executive Vice-president, H. E. Lobdell '17, made his annual report on the operation of the Alumni Association. In this oration, Mr. Lobdell stated that as of April 30, 1954, Alumni of the Institute number 48,671 of which 9,303 are current contributors to the Alumni Fund. At present there are also 91 Alumni Clubs in various parts of the world, of which 69 are located within continental United States, 12 are elsewhere in the Americas, and 10 are overseas in the other hemisphere. In his report, Mr. Lobdell referred to a study made by the American Alumni Council on college financing and covering 302 institutions of higher learning. On the basis of total gifts received by alumni funds from Alumni only, M.I.T. stands 17th out of 302 institutions reporting for the year 1953. However, if the total financial support rendered by Alumni is included, (including gifts of classes, gifts made to the Development Office, and grants of the Sloan Foundation, for example) the situation is somewhat different. The A.A.C. report states "Less than a third of the reporting schools as noted, accepted the invitation to report a total of alumni gifts not credited to the alumni fund. The category of Total of All Alumni Giving is, therefore, only a partial figure. On the basis of reports submitted, M.I.T. leads in this area with $2,230,213, followed by Rutgers with $1,750,196." Mr. Lobdell spoke of the success of Regional Conferences such as that held in Detroit on January 30 (see p. 258, March issue of The Review), reviewed the status of post-baccalaureate Alumni (page 355, May issue of The Review), spoke of the plans for a new Alumni Register, and closed his detailed report by expressing appreciation for the support he had received since his appointment as Executive President as of January, 1947, since which time he has traveled an estimated total of 277,000 miles punctuated by 216 visits to 72 of the 91 Alumni Clubs throughout the world.

Reports of the Secretary and of the Executive Vice-president were accepted with the simultaneous election of members nominated.

Karl T. Compton was then called upon to summarize events of his recent trip to Israel. At present there are 36 Alumni in Haifa, of whom 21 got together to welcome Dr. and Mrs. Compton on their recent visit to Technion, the technical institute of Israel. Dr. Compton stated that his visit was made, in part, on behalf of the American Technion Society, in part on behalf of the Boston Stein Club which is likewise interested in technological developments in Israel, and in part on behalf of Gerard Swope, '95, who has planned a loan for Technion similar to the M.I.T. Loan Fund. Dr. Compton stated that Technion was organized before World War I but, like M.I.T. (whose history was interrupted by the Civil War), did not get into operation until 1926. Technion consists of an Institute of Technology with about 120 students and resembling, on a smaller scale, M.I.T. In addition it has a trade or vocational school, with 800 students, which is roughly comparable to the Lowell Institute School. Student life at Technion is similar to that of M.I.T. students, except that printed technical textbooks in Hebrew are not available. For this reason students of Technion have engaged in a venture to publish notes of their professors and conduct all note-taking, editing, illustration, and publication activities in this project. Before leaving the United States, Dr. and Mrs. Compton invited all present students of Israel to tea and offered to communicate with families and friends in Israel. Five of these students are studying naval architecture as part of Israel's program of overseas trade expansion. At present it appears likely, said Dr. Compton, that an M.I.T. Club might be formed in Haifa.

In reporting on recent events at the Institute, President Killian recalled the awards made at the convocation on May 14 and reported on page 479. President Killian also announced that he had recently been advised by Professor William T. Martin of the Department of Mathematics, that M.I.T. students continue to obtain top awards in competitions run by the American Mathematical Association. He also took obvious pride in reporting achievements of the 150 pound varsity crew whose later successes in England are recorded on page 478. Finally, Dr. Killian announced the establishment of an endowed chair in the field of aeronautical engineering to be named after Jerome C. Hunsaker, '12, as reported on page 479.

Final speaker of the evening was John E. Arnold '40, Associate Professor of Mechanical Engineering, who spoke on "Science Fiction in the Classroom." An unusual approach has been employed by Professor Arnold in his course in Product Design or, as it is sometimes known, Creative Engineering. Although concerned with the teaching of the principles of mechanical engineering, Professor Arnold has striven to develop imagination and flexibility of approach among his students. As one method of getting them to consider new situations he has required his students to design household appliances, transportation vehicles, and similar commonly used items for inhabitants of a distant planet whose physical environment differs radically from that of the earth. Professional men taking summer courses at M.I.T., and regular technology students have found the new method of presentation exceedingly interesting.

Ferdinand Vogel

Robert T. Haslam, '11

Corporation Elections

Elected to life membership on the Institute Corporation are Robert T. Haslam, chemical engineer with W. R. Grace and Company, and Ralph Lowell, President of the Boston Safe Deposit and Trust Company. Theodore V. Houser, Vice-chairman of Sears Roebuck and Company, was elected for a five-year special term.

Elected to a five-year term in a national ballot of M.I.T. Alumni are: Horatio L. Bond, '23, chief engineer of the National Fire Protection Association, Ray P. Dinsmore, Vice president of the Goodyear Tire and Rubber Company, and William J. Sherry, oil producer.

Fabian Bachrach

Ralph Lowell

Mr. Haslam, '11, formerly an Alumni term member of the Corporation, was born in North Adams, Mass., in 1888. He received the degree of bachelor of science at M.I.T. in 1911 and, after one year as assistant in analytical chemistry, entered the Research Laboratory of the National Carbon Company, Cleveland, Ohio, where he became the assistant superintendent. Appointed associate professor at M.I.T. in 1920 and full professor in 1923, Mr. Haslam subsequently directed the School of Chemical Engineering Practice, the Research Laboratory of Applied Chemistry, and the Course in Gas and Fuel Engineering.

After four years as vice-president and general manager of the subsidiary Standard Oil Development Company, he joined the Standard Oil Company of New Jersey in 1935, serving until 1950 as general sales manager, vice-president and director and vice-president. He was a vice-president of Hydro Engineering and Chemical Company and director of the Plantation Pipe Line Company and is currently president of the U.S. Pipe Line Company and a director of the American Gas and Electric Company, W. R. Grace and Company, Dewey and Almy Chemical Company, Ethyl Corporation and Worthington Corporation.

Ralph Lowell, recently a special term member of the Corporation, was born in Chestnut Hill, Mass., in 1890, and received the degrees of bachelor of arts and doctor of laws at Harvard, doctor of humanities at Tufts, and doctor of laws at Northeastern. His positions from 1913–1917 with Curtis and Sanger and the First National Bank were followed by wartime army service in which he attained the rank of Lieutenant Colonel and by his postwar service as civilian aide to the Secretary of War of the State of Massachusetts.

In 1932, after 13 years with Lee, Higginson and Company, Mr. Lowell joined Clark, Dodge and Company and served as a member of the firm from 1937 to 1943. He has been chairman of the executive committee and board of directors of the Boston Safe Deposit and Trust Company since 1943 and president since 1946.

As trustee, director, executive officer, advisor, and corporation member, Mr. Lowell, is associated with 39 educational, medical, charitable, and business organizations. He is a fellow of the American Academy of Arts and Sciences and a member of the Boston Chamber of Commerce, American Cancer Society, National Institute of Social Sciences, Massachusetts Historical Society, and Phi Beta Kappa.

Theodore V. Houser, special term member of the Institute's Corporation, is a native of Kansas City, Mo. Graduated from Iowa State College, he began his professional career as an electrical engineer and is now chairman of Sears Roebuck and Company in Chicago, Ill.

One of the Corporation's new Alumni term members is Horatio L. Bond, '23, past president of the M.I.T. Alumni Association and for 25 years Secretary of the Class of 1923. Chief engineer of the National Fire Protection Association in Boston, he is also a member of the Society of Fire Protection Engineers and of Britain's Institute of Fire Engineers.

Ray P. Dinsmore, '14, a native of Tewksbury, Mass., joined the technical staff of the Goodyear Tire and Rubber Company in 1914 and served in both Canada and California before returning to Akron as chief chemist and research director, assistant factory manager, development department manager, and, in 1943, vice-president. He was assistant deputy rubber director from 1942–1943 and is currently vice-president and director of the Goodyear Synthetic Rubber Corporation. Awarded an honorary doctorate by Case Institute of Technology, Mr. Dinsmore is a trustee of two research foundations.

William J. Sherry, '21, was a petroleum engineer with the Shaffer Oil and Refining Company from 1921 until 1923, when he became an oil producer. Since 1931 he has been president of the Sherry Petroleum Company. A member of the American Mining and Metallurgical Institute, the American Association of Petroleum Geologists, and the American Petroleum Institute, Mr. Sherry has also been active in the M.I.T. Alumni Association, serving as honorary secretary since 1937.

Proctor Portrait Unveiled

More than 100 Alumni of the Institute attended a special dinner given at the M.I.T. Faculty Club on June 14 for officers of the M.I.T. Alumni Clubs and members of the M.I.T. Educational Council. They came from 25 states and five foreign countries.

One of the highlights of the occasion was the unveiling of a portrait of Redfield Proctor, '02, life member of the M.I.T. Corporation and President of the Vermont Marble Company, by Karl T. Compton, Chairman of the M.I.T. Corporation.

The portrait was commissioned by the Institute for the M.I.T. Faculty Club in recognition of Mr. Proctor, a member of the Class of 1902, whose generous gifts on behalf of his Class made possible the adaptation and equipping of the new M.I.T. Faculty Club quarters. It was executed by Gardner Cox, '32, well-known Boston portraitist.

A former governor of Vermont and former president of the New England Council, Mr. Proctor has a record of long service to government, industry, and education. He has served in both the House of Representatives and the Senate in Vermont, is a former member of the board of directors of the U.S. Chamber of Commerce, and has been active in the National Association of Manufacturers. He is a trustee of Middlebury College and during World War I was a captain in the Engineer Corps.

Mr. Proctor holds membership in a number of professional services, and fraternal organizations, including American Society of Mechanical Engineers, Vermont Society of Engineers, Sons of the American Revolution, and the Newcomen Society.

Humphreys Honored

Walter Humphreys, '97, Secretary of the M.I.T. Corporation, received a certificate of appreciation commemorating his 25th year in that post at M.I.T.'s 88th commencement exercises. The citation, the first of its kind ever to be made at an M.I.T. commencement, was presented by Karl T. Compton, Chairman of the M.I.T. Corporation. It read as follows:

Loyal alumnus and faithful friend; keeper of seals, records, and consciences; sometime sailor and astronomer; student of nature; editor and teacher; man of many hobbies and varied interests.

Since 1899 you have served M.I.T. with inspiration and for 25 years you have been the diligent Secretary of her Corporation. You have been a wise advisor whose heart has always moderated every decision of wisdom and experience.

Few have given the Institute so much for so long; none has been more conscientiously devoted to her welfare. In token of all you have done for her, your *Alma Mater* awards to you this certificate of appreciation.

Born in Dorchester, Mr. Humphreys graduated from M.I.T. in 1897. After spending two years with various engineering firms, he joined the M.I.T. Staff as registrar in 1899 and has been associated with M.I.T. or the M.I.T. Alumni Association in a variety of capacities ever since. Mr. Humphreys has also held a number of positions of importance in the wool industry, including the posts of secretary-treasurer of the National Association of Wool Manufacturers, treasurer of the Associated Wool Industries, and secretary of the code authority of the Wool Textile Industry.

Faculty Promotions

Promotions on the Faculty of the Institute which became effective July 1 were announced on June 22, by President Killian.

Members of the Staff promoted to the rank of assistant professor include Richard C. Booton, Jr., '52, of Lexington, and Kenneth N. Stevens, '52, of Waltham, both of the Department of Electrical Engineering and George Economos, '51, of Boston, Department of Metallurgy.

Promotions to the rank of visiting assistant professor include Eliezer Mishkin of Cambridge, Department of Electrical Engineering; and Heinrich A. Medicus of Newton, Department of Physics.

Promoted to the position of Industrial Liaison Officer is Harold R. Lawrence, '52, of Cambridge.

New appointments to the M.I.T. Staff with the rank of associate professor include Major Vernon E. Robbins, Department of Military Science; and Commander Jack A. Obermeyer, '41, Department of Naval Architecture.

Appointed to the Staff as assistant professor are Albert Bush-Brown, Department of Architecture; Herman W. Lewis, Department of Biology; Andrew B. Jack, School of Industrial Management; Irving H. Bartlett and Joseph D. Everingham, Department of Humanities; Paul Pasley, Department of Mechanical Engineering (Mr. Pasley's appointment will not become effective until September 16); and Lee C. Bradley, Department of Physics.

New members of the visiting faculty are Eugene W. Burgess of the National Planning Association, Professor in the Department of Economics; Robert M. Saunders of the University of California (Berkeley), Associate Professor in the Department of Electrical Engineering; and Herman E. Koenig, University of Illinois, Assistant Professor in the Department of Electrical Engineering.

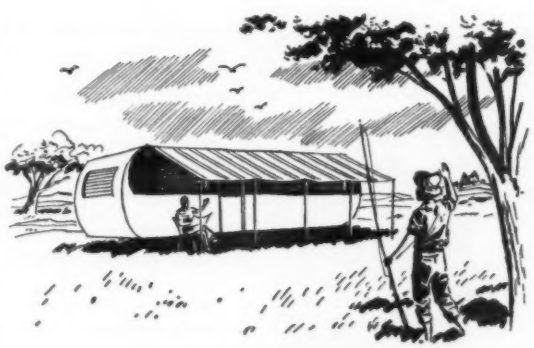
Changes of appointment include Henry M. Paynter, 10-44, of Reading, formerly Assistant Professor of Civil Engineering, who will become an assistant professor in the Department of Mechanical Engineering; Mason Smith of Groton, Professor in the School of Industrial Management, who will become a consulting professor in that Department; and Major Franklin B. Moon of Belmont, Assistant Professor in the Department of Military Science, whose appointment to the rank of associate professor in that Department became effective April 1.

BUSINESS IN MOTION

To our Colleagues in American Business . . .

Many of the millions of people who travel and live in trailers follow a somewhat regular routine. They trek south for the winter, and stay put for months. Then they motor north to a summer place. South or north, they have a need for awnings. You would not think that there would be any special opportunity for improvement in awnings for trailers, yet Revere and an awning manufacturer found one.

These awnings have to be demountable, storable in small space during transit, and of course should be light. An awning maker had been making rafters out of steel tube, in sizes to permit telescoping to save space. Could we save weight without sacrificing strength by supplying aluminum tube? We knew we could, since there is an aluminum tube that is as strong as the steel tube that was being used.



After a careful analysis of the requirements, specifications were set up, and a sample order placed. The specifications included not only the strength of the tube, but also careful control of dimensions, so the two sizes would mate for telescoping, with clearances that would be close, yet not too tight to present problems to the trailer owner.

The sample aluminum tube order was thoroughly checked in manufacture, then tested mechanically for strength and for ease of handling in a trailer park. The aluminum rafters made of this tube proved to be easily fabricated, and they withstood the loads imposed by wind and rain. They are much lighter, look much better, and the customer reports he realizes economies.

An important thing to remember about this case is that Revere makes tube and pipe in copper and copper alloys, in aluminum alloys, and also electric welded steel tube. This presents a wide choice, and makes it possible for us to recommend exactly the metal and form that will best fulfil the needs for each application. Diversification of Revere Products produces benefits for all.

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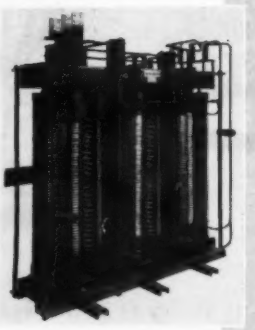

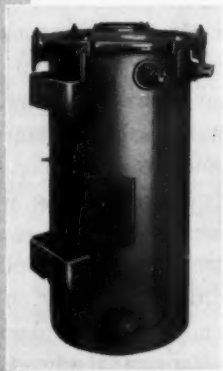

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Chester Meyer, '36, *Works Manager*

THE NEXT 10 YEARS

(*Continued from page 470*)

used, again in a wartime application, to power the submarine *Nautilus* but it has other potentialities.

In 1946, shortly after the end of the War, M.I.T. established the first college course in nuclear engineering. A few days ago President Killian announced that the next step had been taken and that the Institute would acquire and operate, for civilian and training purposes, the first atomic reactor in New England. This device will be devoted to teaching and the study of research materials. The reactor will be designed by civilians for civilian use, and will be a device of inherently high safety. It will be used to a large extent in physics and biology, but also in conjunction with our course in mechanical engineering. This reactor, and the advanced design it represents, is clearly within the tradition of M.I.T. progress, and we must now take the lead and acquire first hand knowledge in teaching nuclear engineering. President Killian has also announced the building of a new structure for the Laboratory of Nuclear Science and Electronics. The Institute's Electronics Laboratory is itself an outgrowth of the wartime Radiation Laboratory.

The electronics field is an exceedingly fascinating one which I find difficult to keep up with. The things to be done in this field are legion, and we may expect to witness much from this comparatively new branch of electrical engineering.

As has already been mentioned, one of the important applications which electronics opens up for us is in the field of data processing. In our Servomechanism Laboratory we have built a numerically controlled mechanism for a milling machine which is able to reproduce intricate machine parts, or even to generate new shapes according to mathematical data punched on a card. It can, for example, reproduce metal parts of extreme complexity, such as a turbine or airplane blade, or cut new shapes without a master pattern.

Electronics is now being used to supplement and supplant the human senses. It was long a tradition in the Navy to depend upon human skills on the assumption – which was formerly justified – that no machines were sufficiently reliable or accurate to replace human operators. Men with courage have insisted on relying on judgment and the human senses unaided by instruments. But this is no longer true. Jet fighters have attained such great speeds that man is no longer able to respond with sufficient rapidity to control such aircraft for his own safety. Man is too sluggish to respond as required when times of milliseconds, or even microseconds, are matters of prime importance. Yet we can build electronic devices that are able to respond to such time intervals and that can aid man's own senses as the need arises.

Again, the operations of the nation-long pipe lines or of the railroads that span our country depend on newly created devices that record statistics and transmit orders automatically. The problems represented by these achievements are not limited to any particular form, or for that matter, to any particular kind of technical profession.

Indeed, it now appears that the traditional professional fields themselves are rapidly changing, and the old lines of course demarcation no longer satisfy their earlier purpose. The old boundaries seem to be crumbling, or possibly, it is the cohesiveness of the M.I.T. family that make this appear so at the Institute. Men trained at M.I.T. are broad in their outlook, and we are turning out fewer and fewer narrow specialists.

(*Continued on page 486*)

A SMASH HIT!

The record of the Institute's early struggles and triumphs

WHEN M.I.T. WAS "BOSTON TECH"

by Dr. Samuel Cate Prescott, M.I.T. '94

When M.I.T. Was "Boston Tech" records the history of M.I.T. from its beginning — a memorandum written by William Barton Rogers on March 13, 1846, entitled "A Plan for a Polytechnic School in Boston" — to the transfer of the Institute to its home on the Charles in Cambridge in 1916. Told in terms of men who built the Institute, this volume is history in the richest sense. . . . President Killian in a Foreword says of it:

"This book, happily, is more than formal history. It is a personal report, an essay in interpretation and remembrance which is important both for what it tells about M.I.T.'s first half-century and for what it tells about what Dean Prescott finds important and interesting in that half-century.

"Dean Prescott has been associated with the Institute for nearly two thirds of a century. He has known all of its presidents save Rogers, the founder. He has known the Institute from the vantage points of student, teacher, department head, dean, alumnus, and parent. He has had a formative influence on its policy-making and he has been an articulate protagonist of the Institute's program and policies. It is important that a man with this long and various experience at the Institute should write interpretively of its history.

"He views M.I.T.'s formative years not only with an expert's understanding but out of a deep sense of loyalty and devotion. This book is a testament of faith in an institution, an earnest of the author's abiding belief in the staff, students, and alumni he has known. Those who have had the privilege of knowing Dean Prescott and working with him will understand why this is true and will cherish this book as another example of his generosity of spirit and his deep commitment to his Alma Mater."

All royalties from *When M.I.T. Was "Boston Tech"* have been assigned by Dr. Prescott to the Alumni Fund.

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THE NEXT 10 YEARS

(Continued from page 484)

Our transportation system is a patchwork quilt that could very well stand engineering of the highest talent; it has been allowed to grow without any overall coordination or effective planning. Each type of transportation system has its own particular benefits and is able to provide a particular kind of service, but these are in no way related; the engineering and economic planning, on a national scale, is badly done. The nation's transportation organizations should provide maximum performance for all transportation requirements and at minimum costs. The problems confronting us cry for solution; here is great opportunity for engineers and engineering to go to work.

In the field of engineering construction, engineers likewise have great opportunities. We should be building our structures with an eye to "unpleasant possibilities" with which we may be confronted. For many years, structures have been built to withstand earthquakes, or at least to minimize damage by earthquakes; our need is of the same kind. I do not propose, of course, that all of our buildings be bomb proof or bomb resistant; but structures should be built at reasonable costs and designed for minimizing damage from bomb blasts.

Sanitation is a continual problem; it becomes more important every day as our water supplies show inadequacies for our present needs, as our population grows, and as we dump industrial wastes into streams, rivers, and lakes. Here is another field for engineering.

Engineering problems in the field of prime movers are overwhelming, especially since we now have all kinds of prime movers, but few of which are truly engineered. Each new art which we create brings with it the need for new equipment; in some fields engineering is still in the stage of an art rather than a science. In these fields metals play an important role, and here again there are great opportunities for the metallurgists to go to work and contribute to our welfare.

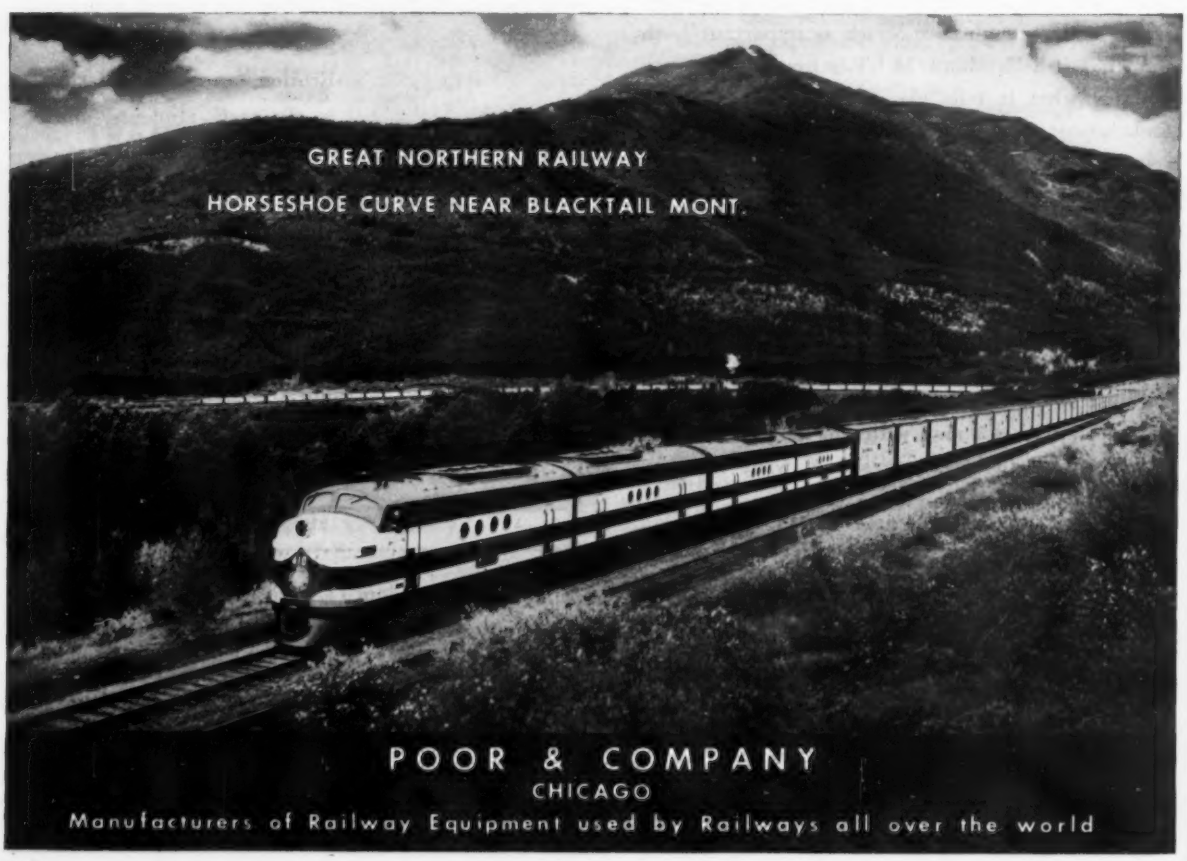
The improvement of prime movers requires new metals able to withstand high temperatures – or perhaps the design of newer ceramics if the temperatures are beyond the melting points of metals. Such materials are in dire need now with the development of gas turbines and jet engines. Great opportunities exist for the development of metals and alloys having high strength at high temperatures; we are just entering this field.

Electrical engineering is in the throes of what may well be a new revolution. It is taking a new look at magnetism, at servomechanisms, and at energy conversion devices. The development of transistors, and a good knowledge of semiconductors, make the applications and theory of electrical engineering much more difficult – but also more interesting – than it was a score of years ago.

To the achievements in chemical engineering, we must now add the new field of nuclear engineering, about which I have already made some reference.

The high rates of combustion at which some of our engines operate demand thorough engineering research. The need seems to be greater in aircraft engines than in the field of marine engines. Yet we must recognize that, in the past decade, the speed of ships has nearly doubled, and the carrying capacity has been quadrupled.

(Continued on page 488)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THE NEXT 10 YEARS

(*Continued from page 486*)

In aircraft, the design fighters pose new problems. We build aircraft with sharp wings, and with a small amount of space allotted to the pilot, the rest being given to guns or control equipment. These modern aircraft must withstand terrific acceleration and deceleration. For years aircraft engineers have talked of crossing the sound barrier — or traveling at speeds in excess of the velocity of propagation of sound; today we take this for granted. We need greater safety in aircraft, and the disasters which occur tell us what we need; they but slightly delay our progress in achieving safety with speed.

At M.I.T. we have recently combined our Course in Building Construction and Engineering with that in Civil Engineering. This was done not because the two have the same kinds of problems, but merely because there is a kinship between the two which makes their administration easy; we must recognize that building engineering also has an important relationship and kinship with architecture.

In the field of food technology we have made good progress, but the engineering still required is extensive and the opportunities for engineers to engage in food manufacture, processing, and packaging are great. In the process, however, let us not engineer out of life the pleasures of our daily meals.

And now I come to our ground rule number three which I have postponed for some time. I would set this ground rule as follows, "Let us keep our powder and the A bomb bay dry, and keep the H bomb locker locked."

What Management Can Do

As final speaker on the symposium program, E. P. Brooks, Dean of the School of Industrial Management was introduced by Karl T. Compton. Drawing upon his very considerable business and managerial experience, Dean Brooks took his cue from the possibilities mentioned by Dr. Bush and Admiral Cochrane and outlined a number of managerial actions which were called for. The essence of the remarks of Dean Brooks are as follows:

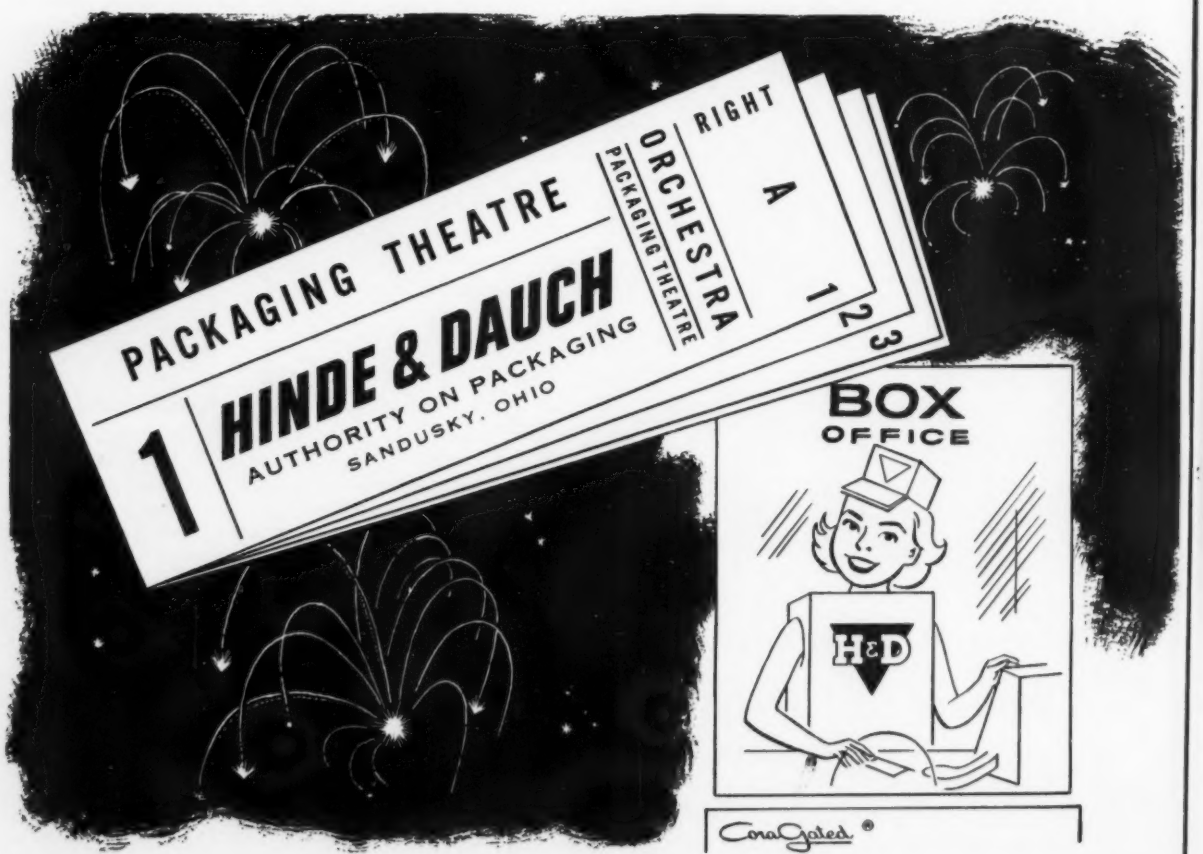
It is somewhat difficult to be the fourth speaker on a program such as this. I think it would be impossible to find three people who could do, and have done, the work of the four members of the panel better than those who have preceded me, and there is little left for me to say that has not been adequately discussed this morning.

In the addresses which were just given, however, I did detect that developments are taking place for which there will be opportunity for the manager to play a significant role; it will be his function and responsibility to bring together the marvelous achievements which have been held out as forthcoming in the reasonably near future. And it will be the manager's job to do these things economically, so that a real service can be rendered to people.

As we look ahead, it seems to me the task of the managers of business enterprises will be stupendous.

Our population is growing at the rate of about two million persons per year. In the last 10 years, for example,

(*Continued on page 490*)



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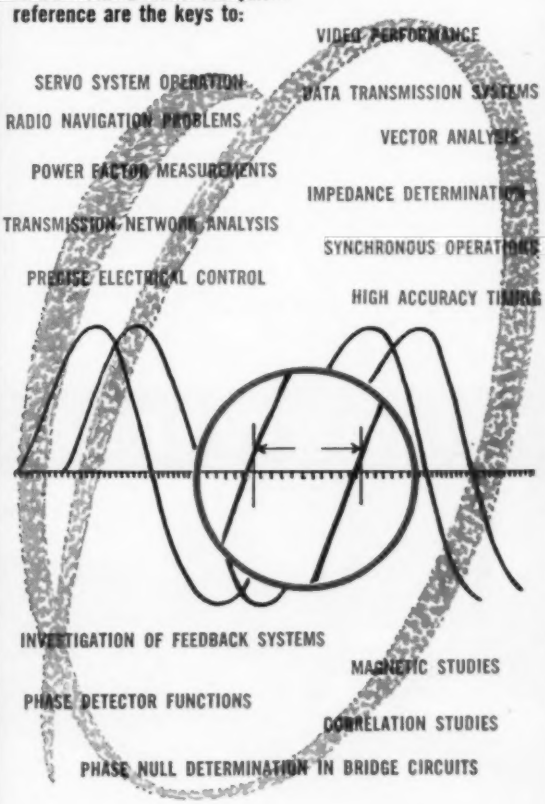

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THE NEXT 10 YEARS

(*Continued from page 488*)

the increase in population in the United States has been two and a half times that of Australia, one and a half times that of Canada, and six times that of Norway. The demands which will be made by the increase in population are very large, indeed. Those of us who live on the Eastern seaboard are probably not too keenly aware of this population growth, because it has been absorbed in our existing cities, towns, and villages; we witness an increase to be sure, but this is not of the startling kind that makes a big impact on us. But if we go to the midwest or to the southwest, we discover villages, towns and cities that are completely new – that did not even exist a decade ago – and that are now making huge demands on our economy. We then begin to see and realize that the rate of increase of our population makes demands way beyond anything that we have yet seen, and as a corollary we must face the fact that the task of production is huge.

How is this new demand to be met? Those of us steeped in tradition will probably first of all think in terms of enlarging the size of our manufacturing plants. The big plants will obviously grow bigger and even the small ones will grow large. This is, of course, one way in which increased production could be achieved.

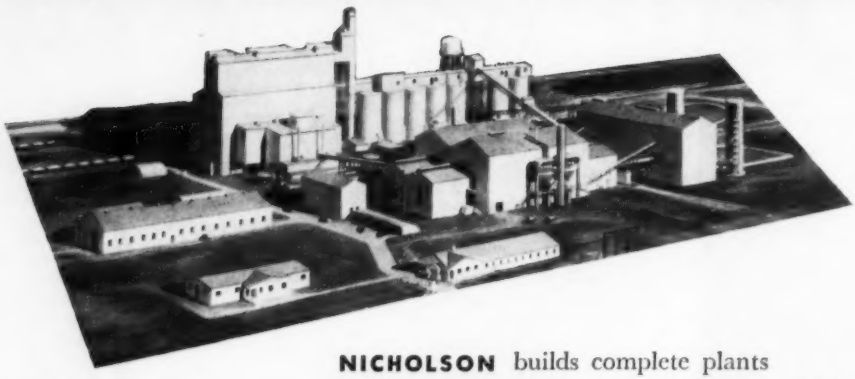
But such a point of view builds up on the past without taking into account the fact that new demands will require new enterprises which cannot be developed by increasing in size, for some of these enterprises themselves do not yet exist and need to be created. These are the enterprises that the inventor and the research worker will bring into being. At the present time, about 400,000 new enterprises are initiated each year despite the discouragement which our tax structure brings forth. Of course there are many casualties among the 400,000 new businesses and we would prefer to see these casualty figures decrease.

In meeting the demands of the future, management is obviously an important factor, and must be seriously considered. We come then to the question, "What can management do?" It seems to me there is one thing that management can do and that this is really its primary obligation. That is described by the word "decentralization." When we use the term "decentralize" many will think of breaking up our productive facilities into smaller units which are then distributed over a larger area than before. This is part of the picture, of course, but I think it is a small part. There should be much more involved in decentralization, if we are to make progress and avoid the evils of absentee management.

But to me, decentralization also means the distribution of decision making policies in order to build an organization capable of having leadership at the point of action. Of course, this is not a new concept in business. But it is not universally or invariably present in business enterprises today. The need for such decentralization is only beginning to be felt in large organizations which operate under one roof. These are, for the most part, the huge organizations, but the same kind of decentralization is equally applicable for firms employing 100 persons or less. How many of us are familiar with the one-man organization, in which all actions and decisions turn about the knowledge and ability and eneregy of one per-

(*Concluded on page 492*)

OUR 40TH ANNIVERSARY YEAR



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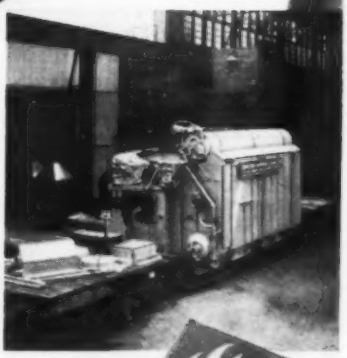

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THE NEXT 10 YEARS

(*Concluded from page 490*)

son? In such organizations there is no opportunity for creative accomplishment, except for the one man who is the leader, and we do not utilize the abilities of others who may be willing and able to contribute, constructively and creatively, to the project. The ability of these persons should certainly be utilized.

What is meant by decentralization? I have given you some thoughts on this subject as it affects our factories and our industries. But there is another vastly more important phase which we should discuss.

With all the tools of modern industry and with all of the great achievements which management can bring into being, let us not lose sight of the fact that our most important resource is man himself; he is at the core of all of the many problems that we face. Man is a creative animal, and he derives his greatest satisfaction from partaking of his creative instinct. We must recognize this fact and feed him and encourage him to develop this creative instinct. It seems to me that decentralization provides the most effective mechanism by which the opportunities for creative accomplishments of men can be made available to and distributed among the greatest number of persons.

The address by Dean Brooks brought to a close the formal portion of the Alumni Day Symposium, "The Next 10 Years." The exercises were ended by Horatio L. Bond, '23, who, as President of the Alumni Association, expressed sincere thanks to those who had taken part in the morning's discussion and declared the meeting adjourned.

THE TREND OF AFFAIRS

(*Concluded from page 460*)

105 feet, and is unimpeded by columns. This large, open space with a 20 foot height is considered ideal for television production purposes.

Tentative remodelling plans drawn by Shepley, Bulfinch, Richardson and Abbott, architects, locate on the main floor the engineer's office, and equipment room and shop, the TV control room and observation platform, a projection room, FM studio and FM control room, a conference room, offices for the program director, the production director and operations, and a lounge and receptionist's space at the entrance.

On the reconstructed balcony will be the kinescope and film department with a cutting room and tape library and film storage.

The rear of the building gives access to M.I.T.'s modernistic auditorium now under construction. It was pointed out that while the possibilities have not been formally explored, the proximity of WGBH-TV to the auditorium would make it possible by a simple transfer of cameras from the studio to the auditorium to televise M.I.T. scholastic seminars and functions, or even audience participation in a TV program.

With $600,000 already on hand through the generosity of several foundations and now being used for construction purposes, including erection of the transmitter station on Great Blue Hill in Milton, hundreds of volunteer workers are now seeking to raise the $453,000 needed for operating funds.

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The annual premium rate for standard insurance under the new Whole Life policy is only $17.59 per $1,000 at age 25; $23.59 at 35; $33.64 at 45; $50.46 at 55. Policies with waiver of premium and double indemnity benefits are available at slightly higher rates. New York Life is a mutual company and pays dividends to policy-owners only. Dividends can be used to reduce the low premium payments.

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Low as the premium rates are, this policy builds high cash and loan values fast—equal to the full reserve at the end of the seventh year. For example, the seventh year cash and loan value of a policy taken out at age 25 is $92 per $1,000; at 35, $123; at 45, $164; and at 55, $213. The low premiums, high cash values, and dividends combine to make this policy unusually attractive. Get details from your New York Life agent!

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Countless business and professional people are faced with the twofold problem of maintaining their living standards at today's high costs and setting up the kind of *future* financial security they'd like their families—and themselves—to have.

For these people, New York Life has developed a new life insurance policy—one which is remarkably low in premium cost, yet builds up high cash values quickly.

This new policy is, in effect, life insurance in the "economy size" package. Since the minimum amount is $10,000, economies are possible which keep the premiums low.

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COMMENCEMENT AND ALUMNI DAY

(*Continued from page 476*)

Alumni Day Activities

On Monday, June 14 — a rather chilly and gray day — the Registration Desk was opened at 8:15 for Alumni to pick up their tickets or for late comers to register for events of the day. At 10 P.M. the nationwide Civil Defense "Operation Alert" took place. Thus was the gravity of international affairs unintentionally brought to the attention of Institute visitors, Faculty, and staff.

At 10:30 the Alumni Day Symposium was held in the Hayden Library Court. Speakers for this conference, entitled "The Next 10 Years" were Karl T. Compton, who opened the symposium and introduced Vannevar Bush, '16, Dean E. L. Cochrane, '20, and Dean E. P. Brooks, '17, scheduled speakers for this event. The Review is happy to present its own report of these stimulating addresses, beginning on page 467 of this issue.

Alumni Day Luncheon

As has been customary for the past few years, President Killian used the Alumni Day Luncheon as the means for presenting his annual report on the state of the Institute. Incidentally, this year marks the fifth year of Dr. Killian's presidency, and the 50th anniversary of the first Alumni Reunion.

In opening the addresses after the luncheon, President Killian commented on the certificate awarded to Walter Humphreys and, as recorded on page 482, presented him with a set of bone china plates — numbered 97, in gracious recognition of the fact that Mr. Humphreys is a member of the Class of 1897. Second to be remembered for honors was Jerome C. Hunsaker, '12, for whom a new professorship in aeronautical engineering has been created, as is also recorded on page 479.

President Killian called on Alumni to join together to strengthen the democratic ideals of social justice, freedom, and individual dignity. "We have an obligation," he declared, "to resent every encroachment upon these ideals and every act which erodes away this freedom and this dignity. We must cultivate and demonstrate the moral idealism which must underlie the strength of our society."

(*Continued on page 496*)

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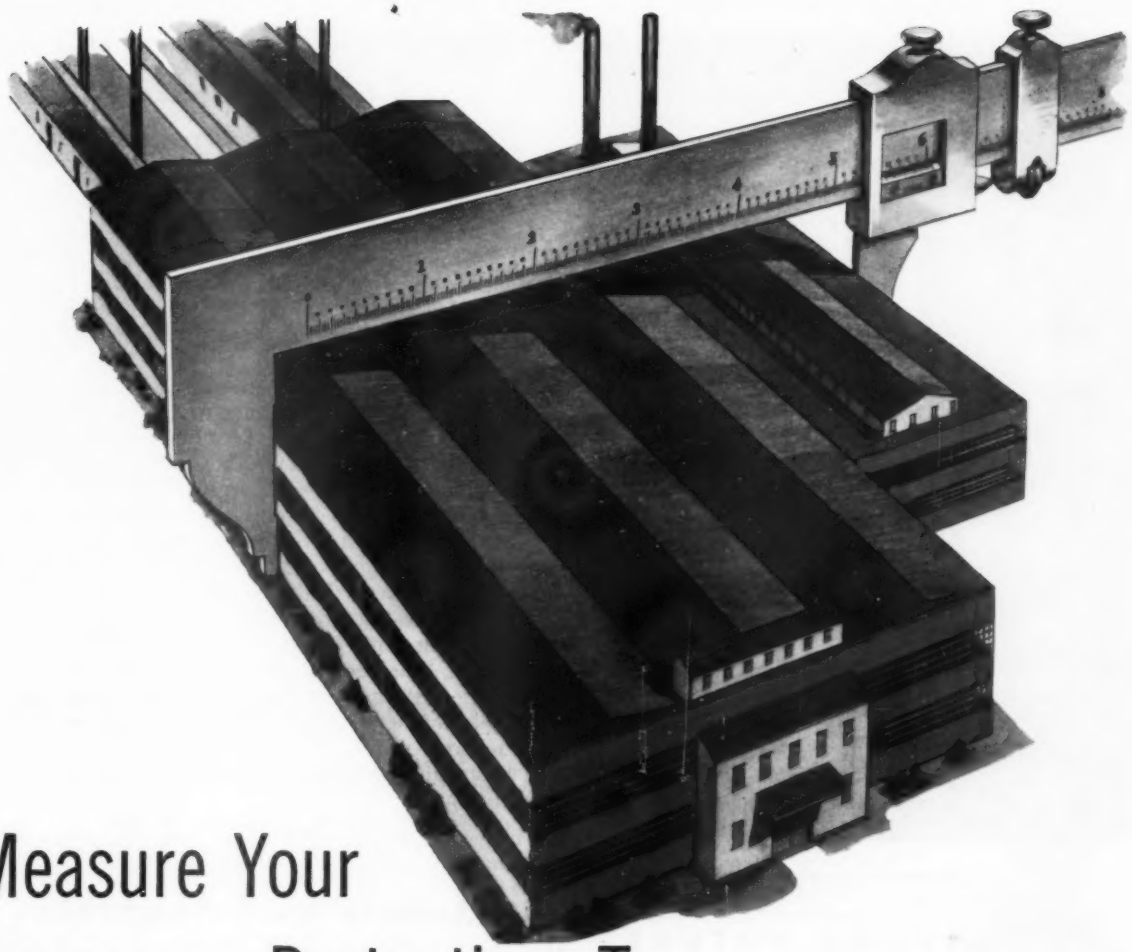

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COMMENCEMENT AND ALUMNI DAY

(Continued from page 494)

"Ours is the opportunity," he told his audience, "to give a pilot-plant demonstration that men and women may live and work together with a minimum of unfriendliness, meanness, carping criticism, and irresponsibility." The great responsibilities of scientists and engineers today, Dr. Killian said, are to keep us moving ahead steadily in the development of industrial technology and in the management of our technological industry.

"While serving the nation's safety, economy and industrial development, men of science and technology also serve man's need for understanding and for spiritual growth. Indeed," he said, "science finds its fulfillment not only in the great practical structures it creates but also in the insights it provides into the order, the majesty, and the mystery of the universe."

The Institute, he said, recognizes "an inescapable responsibility to deal with ideals as well as ideas and to concern ourselves with values while we become proficient with things. This responsibility," he declared, "has been implicit in the plans and program of the Institute since its inception, and these concepts will continue to characterize our program and our education." Thus he promised, M.I.T. will have a steadily increasing importance in the life of our nation.

(Continued on page 498)

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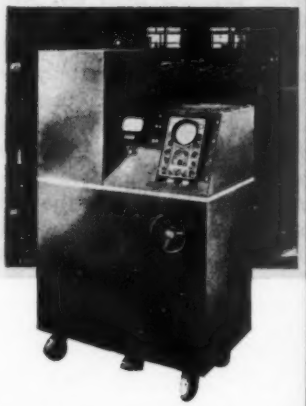
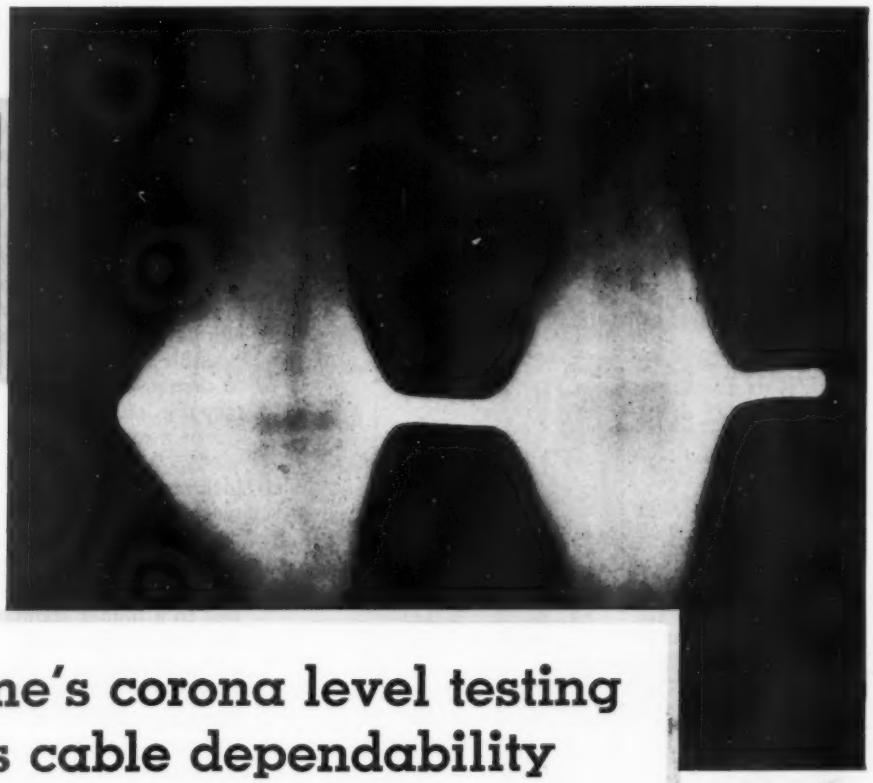


Specially designed ionization detector for routine factory use measures corona level of all-insulated cables rated at 3000 volts or over.



Why Rome's corona level testing assures cable dependability

The picture above means trouble. It is an oscilloscope trace of internal ionization in an insulated cable.

Ionization is caused by the electrical break-down of air in pockets within the insulation, or between the insulation and conductor or shield. Should this ionization occur at a value below the operating voltage of the cable, several destructive electrical effects may occur such as possible ozone cutting, reduced dielectrical strength, and a substantial increase in dielectric losses. Any of these hazards could result in early failure or reduce the efficient performance life of the cable.

Ionization is particularly dangerous because it cannot be detected by the ordinary visual, physical and electrical testing methods usually applied to cable.

So, to prevent guesswork, to assure you of maximum protection against ionization, *every foot of Rome insulated cable, rated at 3000 volts or over, is thoroughly tested by a specially designed ionization detector.* This instrument accurately measures the corona level of the entire cable. Unless the ionization voltage exceeds the intended operating voltage, the cable is rejected.

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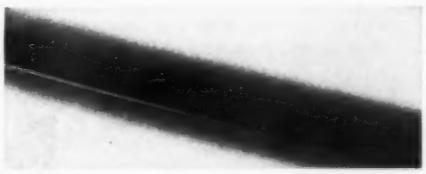

This X-ray reveals loose insulation—a major cause of ionization.

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COMMENCEMENT AND ALUMNI DAY

(Continued from page 496)

Following are additional excerpts from Dr. Killian's annual report to M.I.T. Alumni:

"Though we must build bombs in a world out of joint, we will move ahead into a better time only by improving the lot of mankind and addressing ourselves to more noble ends than atomic might. The use of science for defense is necessary, and we cannot be strong without it. But such use of science and technology is not a natural or satisfying use and in the end can only thwart and distort their true spirit. Is it not possible that bold and imaginative acts by Americans to demonstrate the moral purpose and the non-military uses of science and technology can contribute to our own reassurance and to our leadership of a world seeking peace? Our great resources of intelligence, imagination, ingenuity, and risk-taking spirit are moral forces that can lead a world out of a cold war. Science, with its spirit of creativity, its search for understanding, its dependence upon freedom and good will, and its world-wide currency, offers an avenue to a higher standard of living for all the world, but more importantly, to a resurgence of a spirit of reconciliation and good will among nations. In this period of cold war, we are engaged not only in an atomic armaments race but in a race to apply atomic energy to peaceful and beneficial use. This is a race we must win not only for our own welfare but for our influence in the community of the free world.

"For the fifth successive year donations to M.I.T. have exceeded $5,000,000. The needs, the opportunities, and the responsibilities of the Institute warrant an all-out effort to maintain and augment in future years this level of donations.

"It is pleasant to report that the demand for M.I.T. graduates continues high. In fact, more companies sought men at the Institute this year than last. A total of 325 different employers sent representatives to the Institute to interview students; and 400 additional companies invited students to visit them or to apply for jobs, thus making a total of over 700 employers who look to M.I.T. for men.

"It is interesting to note that from one-quarter to one-third of our students, year in and year out, go into graduate study, a figure that probably will increase for each class when those who are in military service are free to continue study.

(Continued on page 500)

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FOR RPM MEASUREMENTS— WESTON electrical tachometer indicators are available with scales calibrated in RPM, or any function of RPM, such as feet per min.—pieces per hour, etc. Indicators can be mounted remotely; and if required, more than one indicator can be operated from one generator. Special compact, lightweight a-c and d-c generators permit wide flexibility in mounting and connection arrangements. Directly indicate speeds from 1 RPM to 40,000 RPM or higher.

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CITIES SERVICE
QUALITY PETROLEUM PRODUCTS

An Important part of the American Oil Scene

COMMENCEMENT AND ALUMNI DAY

(*Continued from page 498*)

"Based upon the numbers already enrolled in our grammar and secondary school system, it is clear that the numbers wishing to enroll in post-high school institutions may possibly double in the next 15 years. Should this enrollment increase occur, the United States will be faced with the problem of doubling the capacity of its system of higher education. If we are to provide the same amount of facilities per student throughout the country as we do today, this would mean that we would have to build as much college plant in the next 15 years or so as has been built in this country in the past three hundred.

"During the past five years, M.I.T. has gone through a great period of building, the greatest, in fact, since M.I.T. moved to Cambridge. In 1948 the value of our educational plant totaled 19½ million dollars. At the end of this year, the value will stand at over 34 million dollars. This building program has largely done the job of providing the modernization for the educational and living facilities we need, but an institution such as M.I.T. inevitably finds that the obsolescence of educational facilities in science and engineering are very great and that, perhaps more than most institutions, we have a problem of keeping up to date. An example of keeping up to date is the building of the nuclear reactor laboratory, the plans for which we announced at Commencement.

"We are witnessing important changes in our educational program at the Institute, and it would be my prediction that in the next five years we are going to see a steady progression in the art of teaching science and engineering. We have had a great development in the last five years in the strengthening of our humanities, social sciences, and general education. We look forward to still further development in this part of the program.

"There are in prospect many extensions of the great drive we have had to give increased emphasis to the humanistic and social sciences part of our program. But with all of this development in the areas of our School of Humanities and Social Studies, I would forecast that the most important changes will occur in our Schools of Science and Engineering. We may well be initiating profoundly important innovations in the teaching of engineering. It is invidious to cite examples, but I have time to report on activities in only one department.

(*Continued on page 502*)

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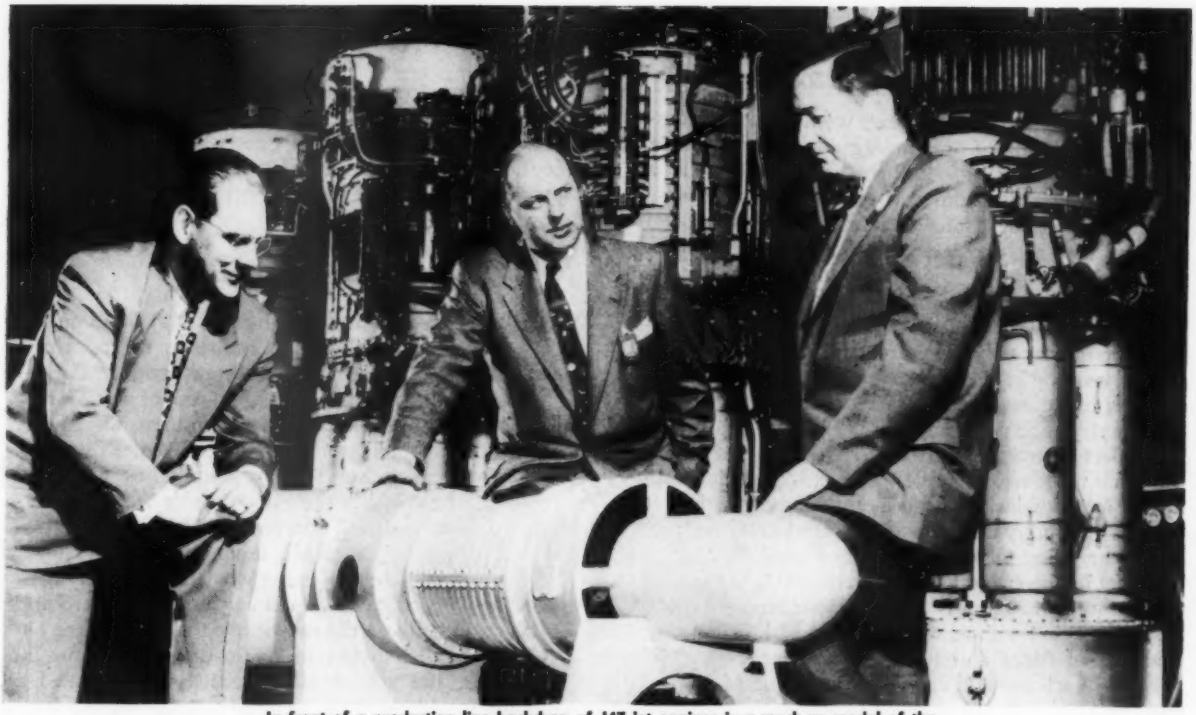

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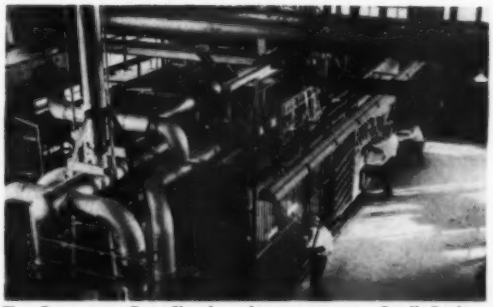

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COMMENCEMENT AND ALUMNI DAY

(*Continued from page 500*)

"During the past several years we have had a complete reorientation of our undergraduate program in electrical engineering, and just recently when a delegate visited us from one of the great electrical manufacturing companies to examine what has been accomplished and projected, the reactions clearly indicated that in his judgement something profoundly important had taken place in the education of electrical engineers and that this new program in our department would not only have great influence on the advanced training in electrical companies but would also have its influence in engineering schools throughout the country. The new program in electrical engineering seeks to provide a broadened and deepened scientific content. It seeks to give the electrical engineer an insight into the design and use of modern materials. It provides a wholly new concept of laboratory instruction in an effort to develop engineering judgment.

"What has occurred in this department is but typical of the innovation that is taking place throughout the Institute. What we are witnessing at M.I.T. is a new coalition of ideas and ideals, of science and social science, of science and applied science and of general and professional education – a coalition designed more adequately and fully to meet the increasingly complex needs of our society – an education up to date in its outlook and relevant in its content to the needs of an industrial society."

President's Reception

Following the Alumni Day Luncheon, President and Mrs. Killian followed a tradition of long standing in welcoming Alumni and guests at an informal reception in the President's House. Many of the class presidents of the 40 most recent classes assisted the hosts.

Ladies Banquet

As Alumni gathered for their annual Stein-on-the Table Banquet in the main ballroom of the Hotel Statler, approximately 170 ladies gathered in Parlors B and C for the largest Ladies Banquet of any Alumni Day. As Chairman of Ladies Committee, Mrs. E. P. Brooks was mistress of ceremonies. Mrs. Killian remarked about those distinguished ladies who had come from especially distant points or who had performed distinguished service to M.I.T. and introduced Miss Julia Comstock, among others.

Major event of the evening was an address by Mrs. Karl T. Compton who gave a very well organized and informative talk on the recent trip to Israel where Dr. Compton participated in dedication ceremonies at Technion, the school of technology at Haifa. Dr. Compton addressed the Alumni Council on the same subject at its last meeting on May 24, and the substance of Dr. Compton's remarks is given in condensed form on page 480 of this issue.

(*Concluded on page 504*)

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BOSTON

COMMENCEMENT AND ALUMNI DAY

(*Concluded from page 502*)

Stein-on-the-Table Banquet

Monday evening, 787 Alumni – the smallest number reported in The Review during the last decade – held their annual Alumni Day Stein-on-the-Table Banquet in the grand ballroom of the Hotel Statler in Boston at 7:00 P.M. As usual the traditional steins, designed by H. B. Kane, '24, and showing a portrait of President Maclaurin were highly regarded souvenirs of the occasion.

After dinner, Horatio L. Bond, '23, President of the Alumni Association for 1953–1954, reminded the audience that June 14 was Flag Day, and, in his role as presiding officer, introduced those who had come from the greatest distances.

Horace S. Ford was then asked to conduct to the speaker's table Wolcott A. Hokanson, who was made an honorary member of the Alumni Association and also an honorary member of the Class of 1923. Mr. Hokanson responded graciously and with obvious pleasure at the unusual recognition accorded one who is not an alumnus of M.I.T

Louis H. G. Bouscaren, Class Agent for the Class of 1904 presented a class gift of $15,000 from the 50-year Class, and C. Brigham Allen, President of the Class of 1929, made a presentation of $132,000 for the 25-year Class. Both were gratefully and graciously accepted by Karl T. Compton on behalf of the M.I.T. Corporation.

Dr. Killian then made grateful acknowledgement of a book entitled *When M.I.T. Was "Boston Tech,"* written by Dr. Samuel C. Prescott, '94, and published that very day. This history of the Institute, covering the period from the original plans for an Institute of Technology to the move to Cambridge in 1916, is an authoritative study by an Alumnus who has seen the Institute as student, professor, department head, and dean, and who retains interest as an emeritus member of the staff. Dr. Prescott has known all presidents of the Institute except the founder William Barton Rogers; his book is reviewed on page 457 of this issue.

Dr. Killian then called upon William B. Given, '08, to deliver the banquet address, which The Review is happy to bring to its readers (page 465).

Upon conclusion of Mr. Given's address, Mr. Bond expressed his appreciation at having been asked to serve as President for the past year, and his appreciation for the help received and introduced Hugh S. Ferguson, '24, President of the Alumni Association for 1954–1955. In taking the chair, Mr. Ferguson expressed gratification at the high honor bestowed upon him. Then by asking the audience to sing "A Stein Song" led by O. B. Denison, '11, and with Harry U. Camp, '18 at the organ, Mr. Ferguson brought a successful conclusion to festivities of another Alumni Day.

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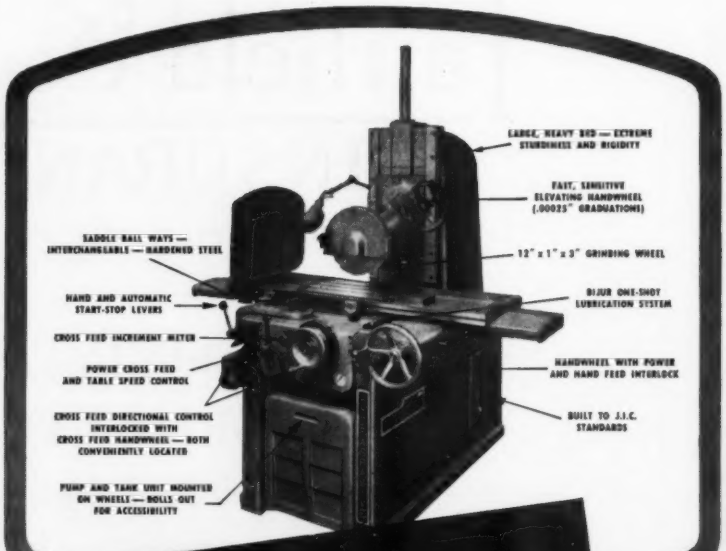
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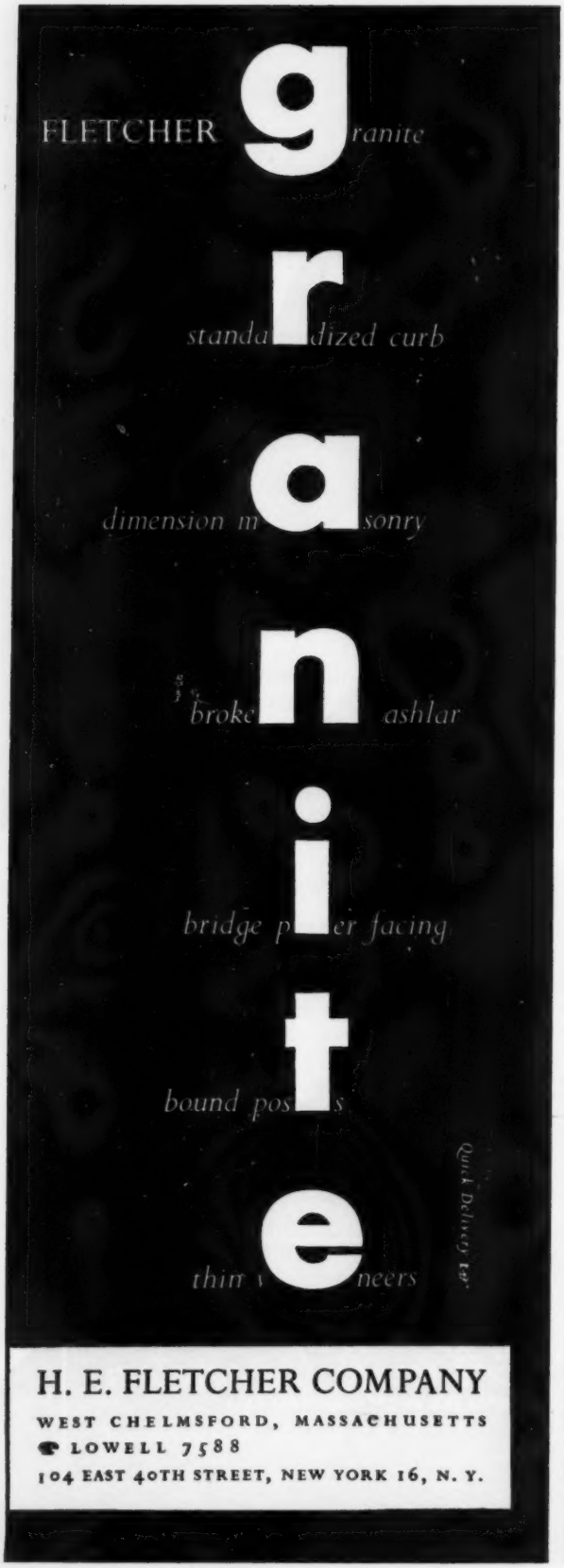

THE ENGINEER IN MANAGEMENT

(*Continued from page 466*)

and likewise hardest thing to learn is when to throw away the rules." Also, he wrote: "A broadening, and likewise rewarding experience, which must be sought, is to become actively interested in local affairs."

There are many references in these letters to the importance of enthusiasm. A sales manager felt "many engineers are low in enthusiasm." Nearly every letter stressed "team play" as a must for management places. Some remarked that service in the armed forces frequently speeded up the individual's understanding of people.

Another who went to M.I.T. said, "I believe that an engineering background will yield better management people than a liberal arts background, but this is only if, and it is a big if, the engineer has inherently or has acquired the necessary amount of humility." In my period at M.I.T. some of us felt that students with high marks had little of that asset, but people lacking humility usually acquire it with age. The M.I.T. man wrote also: "If engineering graduates could sooner be brought to recognize the necessity of compromise between time and thoroughness of treatment, it would help them train themselves earlier for management responsibilities." Also some of their elders might live longer. My quotings are ended.

All of us in management realize we must still seek needed education. The day that feeling ceases, we should be retired. As years run on there is a stronger and stronger feeling of a growing need for a better understanding of people – and no two of them are alike. John Stuart Mill said: "Men are men before they are lawyers or physicians or manufacturers; and if you make them capable and sensible men they will make themselves capable and sensible lawyers, physicians, or manufacturers." We can add the category of engineers to these words to good benefit.

Recently, I was asked to rate our division heads and the others in important jobs. I started by listing the needed qualifications common to all top management places. To me, these are qualities all important for management positions. Note that most of them have to do with the kind of a person the man is: (1) Leadership – it comes out of rating people's confidence. (2) Courage – it grows when you believe

(*Continued on page 508*)

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THE ENGINEER IN MANAGEMENT

(*Continued from page 506*)

"freedom to fail" is real. (3) Judgment of people – it increases as your real interest in people grows. (4) Imagination – everyone can supplement theirs by borrowing from friends. (5) Depth of interest – it comes out of happiness in your work. If that's impossible – another job is indicated. (6) Getting the job done – here we can all mend our ways. It is an important factor. Engineers often over-extend the exploration time. (7) Specialized knowledge – here the engineer is at his best. (8) General knowledge – here many need widened interests. (9) Integrity – without this, no one qualifies for Number (1) – leadership.

Fortunately, every man with determination can improve and can continue to improve his rating in each of these nine areas. The young engineer looking forward to a management position cannot start facing this fact too soon, and it is never too late to improve. Probably most of you went to engineering school to get ready for engineering. It is surprising how many engineers drift into management jobs and then have to pick up the extra knowledge that is necessary. The engineer who wants to go into management should get ready for it by exposure to and study of all the areas and problems of business.

We who have moved into management places must continue to concentrate on further and wider development of interested engineers. We must ask ourselves: "What is my basic philosophy as to their development?" and "Do I qualify as their coach?" We ask ourselves, "Do I encourage their reaching out into all areas of the company for more knowledge on many subjects to learn and to help?" Ask, "Do I as far as possible promote our own people rather than go outside to fill good jobs?" This policy is a great stimulant to all juniors. Ask, "Am I actually seeing to it that decentralization exists in all ranks? Has, for instance, the Director of Research sufficient authority? A tight budget can defeat that. Do I remove men who have the conceit to feel their judgment is tops in all areas? Do I make all-out effort to create stability of place for all good men – even in sharp recessions? Do I unseat the men we feel are the wrong ones on the human side?"

There are many interesting questions about executive development that you do not have time to hear

(*Concluded on page 510*)

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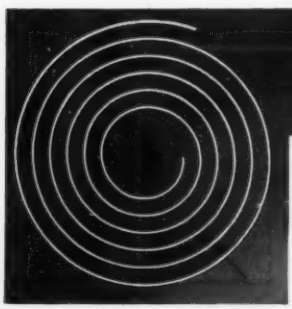
THE ENGINEER IN MANAGEMENT

(*Concluded from page 508*)

me discuss. For example, how do you teach the teachers – the bosses – to teach? We spent 10 years at this before we began to make any real progress. We are trying to help teachers to a better understanding of this responsibility. You must prove to the teacher that to succeed he must know the man – really know him. He must reach into the experience of other teachers in colleges and in business for guidance. He must read the helpful articles and books – of which there are many – and review the characteristics of those persons who were his most effective teachers. Probably most important of all, he must sell the fact that developing others is, or at least should be, the best route to promotion. In the process the teacher will find an increasing urge, on the part of the younger men, to reach out for more knowledge in wider areas; he will advance the idea that exploring what juniors think of bosses, instead of vice-versa, has great value. The fundamental of effective teaching is earning the confidence of the man that you are trying to teach.

In conclusion, executive development is a business assignment, yes, but it is also a human assignment. People ask where is the difference, in the end result, between this company and that one, between this boss and that one. I feel that the biggest, the most fundamental difference is that to one type of person the job of developing people is merely a business problem. It's one of the jobs he does to earn his salary. By contrast, to the other, developing people provides an opportunity to have his business career as important as possible to many individuals. It is something he does because he has a personal need to do it. By setting his sights on the goal of helping as many others as possible to have greater fulfillment in their work lives, he finds greater fulfillment.

Scientists and engineers are making exciting contributions to life. Today you have again heard that there are an endless number of new and revolutionary developments in the offing. These new developments will need greater and ever increasing management abilities – greater competence. That is the challenge faced by an engineer in management. This makes greater the challenge to us in management who, whether engineers or not, have opportunities as teachers, to make great contributions to the progress in the next 10 years.



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OUR GREATEST RESOURCE

(*Continued from page 464*)

stop learning, to have the will to find out and, having found out, to hold fast to the privilege, and never be afraid of changing their opinion on the basis of new facts.

Most of my life, and yours, too, has been spent in combat, whether we realize it or not. The seen and unseen wars in which we have been engaged, have radically altered our lives from the pattern established by our ancestors, and have warped the whole structure of American society. Under the pressures applied by men of evil under foreign flags, this nation has been forced into the leadership of the free world. And from this lonely plateau there can be no retreat except at the risk of destruction. We are a peaceful people. Our history parades no lust for conquest, no despotic drive for international power. But through the accidents of size, geographical position, and sheer wealth of natural and human resources, we have been compelled to champion the whole western world. The fact that we did not seek this leadership, that it came in part as a by-product of self-preservation, did not reduce its frightful cost. Nor will it reduce the prodigious cost of maintaining it. But the first duty of leadership is to lead. The ability of this country to maintain leadership among nations depends not only upon the high quality of its spokesmen, but upon the morale, unity, and energetic goodwill of the great body of its people. We have only to look at western Europe to find current proof of the old adage that a house divided against itself cannot stand.

It is inconceivable that America can ever sink to a like state of helpless confusion. But I think most of us will agree that there are forces at work which could sap our moral strength and distract our attention from major issues, and which contain at least the seeds of the dissension that sets brother against brother. Let me accentuate the obvious. Our national strength is simply the sum of our individual strengths — 160 million of us. The very essence of the private enterprise system is the recognition of the integrity of the individual and his right to property and freedom of choice. But along with the opportunities and

(*Concluded on page 514*)

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OUR GREATEST RESOURCE

(*Concluded from page 512*)

rewards of personal liberty go basic responsibilities. These include respect for truth and decency, and a willingness to accord to others the rights to freedom of inquiry. They include also the responsibility of the individual for working with his fellows for social and economic progress. Finally our responsibilities ask of us a blueprint for the guidance of future generations. These social virtues so vitally important to our new leadership cannot be legislated — cannot be imposed. They must be desired, worked for, and won by the individual.

In conclusion, we are relearning, painfully, and at enormous cost, some of the truths envisioned by our ancestors. We are learning, for instance, that the free association of men of good will — pooling their interests, energies and resources for the general welfare — can be a force for good far in excess of the simple addition of their individual wealth and manpower. Indeed, here is one case, at least, where two plus two equals five. We are also relearning that there is a kind of fourth dimension to the mind of man — a reserve of dignity, a capacity for generosity — which can be summoned and harnessed when the right tocsin is sounded. Finally, we are relearning and applying age-old techniques for sharing responsibilities and the useful products of their discharge.

I say we are relearning these things because no one of them is new; they are all as old as mankind itself. But sometimes they are overwhelmed and swept away by the equally primal selfishness that still lurks deep down in everyone. It must be our job, above all else, to root this selfishness out of our own hearts and demonstrate, throughout the world, that human happiness and progress can be purchased only with the currency of mutual respect, trust and cooperation.

As we work together — each assuming the responsibilities of freedom along with its opportunities — let us never subscribe to the totalitarian belief that "the end justifies the means." Let us be eternally vigilant, lest, in the name of patriotism and democracy we unwittingly destroy those very freedoms and rights that we proclaim.

If there ever were a time for the exercise of Christian virtue — of that faith in God which gives meaning and purpose to human life, and to the concept of the brotherhood of man — that time is now.

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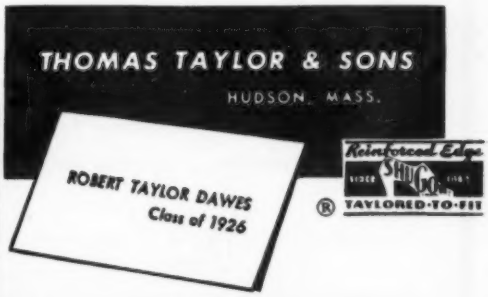

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THE EDUCATED MAN

(*Continued from page 462*)

haven't selected him. Somebody else did, and after the first blush of enthusiasm is over, you'll find him quite dreadful. And there you are locked in with him. You must study yourself and you must study him in order that, having become aware of his limitations, you will also become aware of his strengths. You mustn't let the smell of his pipe bother you, if he's actually a good man. You must build that teamwork on the strengths and not the limitations. Remember he probably doesn't like your wisecracks either. Now that goes on through all the realm of supervision, to which most of you aspire. If you are given charge of a team, you must learn to develop that team. And you can't do that, my friends, by a chart, or a graph, or a table, or an electronic brain. You must evaluate the men given into your charge. You must build their strengths into greater strengths and serve to reduce their limitations. So I say that the educated man must have insight into human behavior. He must have a deep sense of obligation to his community. He must realize that the great values which reside in what we call the American way of life are not self-perpetuating; that the freedom to pursue his own life and make his own choices, which he prizes, carries with it a deep obligation to perpetuate that system. There is no leisure group of great and able men far removed from daily life awaiting call to serve the public at every level of the community. Those jobs are done only by the educated men who are extraordinarily busy with other things.

If I were to make today one single indictment against the American business community, I would say that too many businessmen live out their entire lives outside the realm of responsibility for the welfare of our country. It is the incentive of self-interest that sparks the great productivity of our country, that has given America the highest living standard in the world, and makes the United States the bulwark of free nations everywhere. But when the incentive of self-interest reaches the point where it becomes an exclusive preoccupation with self, then the question arises in the minds of thoughtful observers as to whether our great country is beginning to be decadent. Other great nations have passed into history, and those who were present when the process began did not sense it and know it. The challenge today is: Are we rearing in our midst those who, in terms of leadership and character and public responsibility, are the equals of those who created and preserved our republic? Preoccupation with self will not do it. I said the other day, and I repeat here, solemnly, the first duty of the American businessman is not to his company but to his country, because there will be no American system of business as we have known it unless our country continues strong and vital, and measures up to its awesome responsibility in the world. That begins, my friends, the day after you leave this institute. Your job at the beginning is at the community level. That means helping with the

(*Concluded on page 518*)

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THE EDUCATED MAN

(Concluded from page 516)

schools to which your children will go, it means the church, it means all of the community services, it means entering into political life in the best sense, joining a political party, knowing what political creed you espouse and furthering it in the great American faith. Then going on into the more mature positions of leadership, like these grand men behind me who have exercised the responsibility involved in trusteeship in this great institution and finally, when you stand in the overhang of senility, as I do, entering into the public service. Those then, in my judgment, are the marks of an educated man.

If I were your employer I would want to know what you do with your spare time. I would want you limiting your work to the work day. I would be suspicious of you if you were carrying work home at night. That would probably show that your life was not well disciplined. I would want to know what reading you were pursuing. If you were a metallurgist, I would be happy to know that you were taking night classes in economics, or literature, or attending the symphony. And if I were making this address to a liberal arts college, I would say that I would be interested in knowing whether you spend your time studying history and literature or were taking chemistry or physics at night. I would want to know the extent to which you were following the great questions of the day, by which I do not mean sitting in front of a television set. I mean honestly endeavoring to understand the great questions; not by observing but by participating. Our national debates were virile when men rode on horseback a hundred miles to hear Lincoln and Douglas, not when they walked from the dining room into the living room. I would want to feel that your adult education was going forward apace on a vigorous basis all of your lives, and that you were determined not only to receive but to contribute to the stream of public opinion about you.

This is a great day in your lives. It is a great day for those of us who have the privilege to share it with you. The American heritage was created by sacrifice and must be preserved by sacrifice; and sacrifice to be effective requires understanding of the American way of life. Other men in your day, and mine, have died to preserve it. Ours is the privilege of living for it. Let us give of our best.

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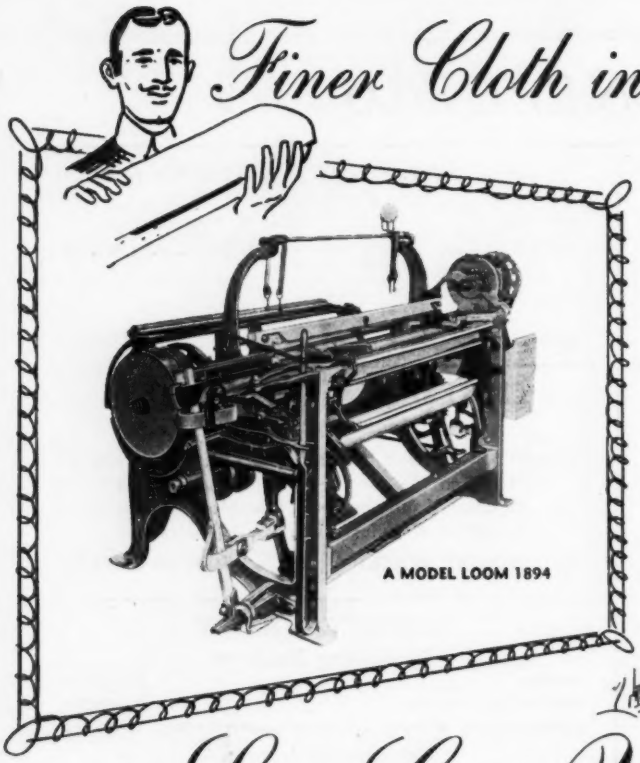

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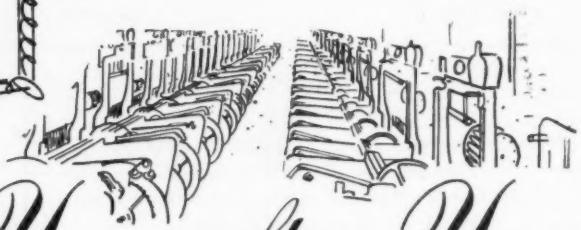

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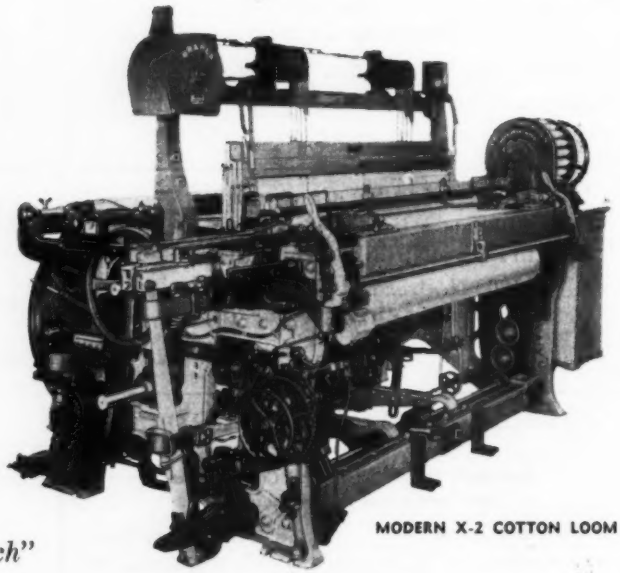

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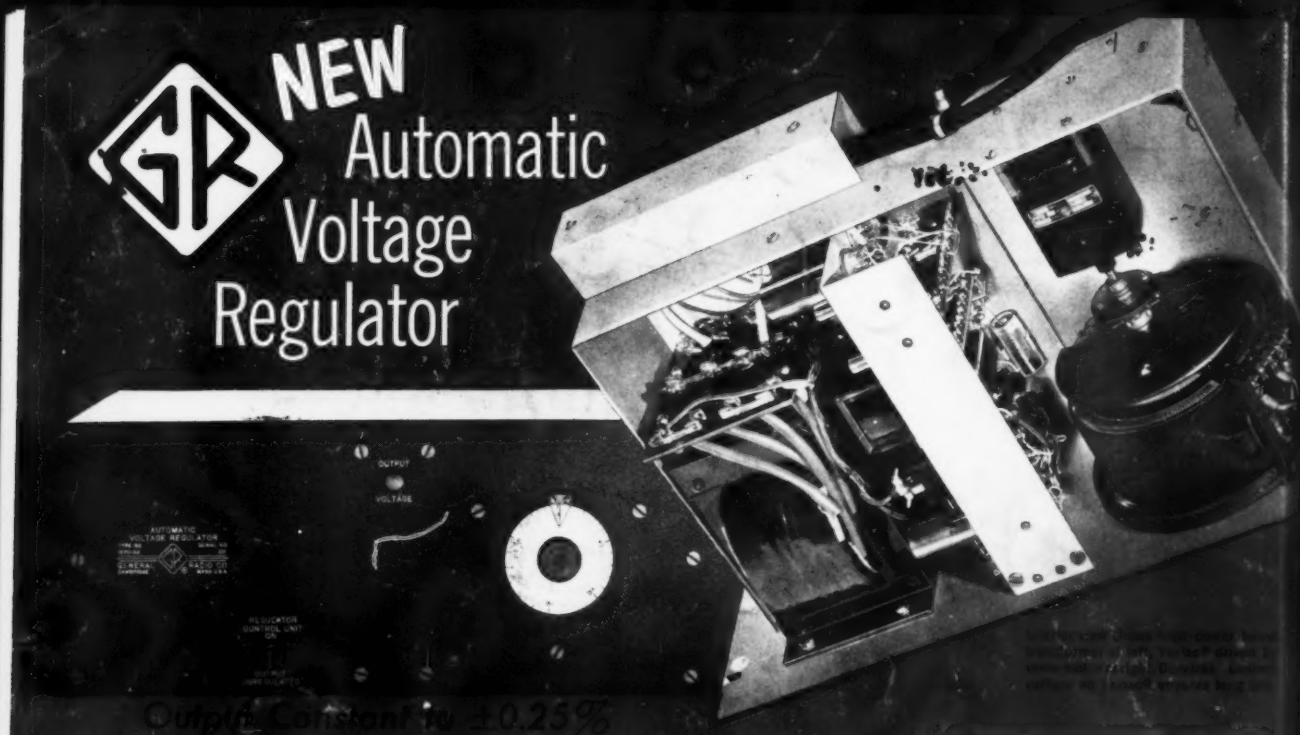

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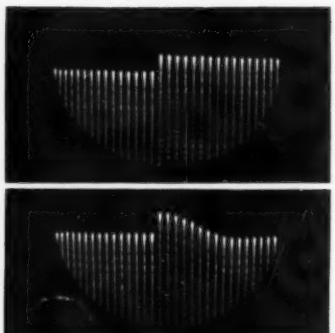

Oscillograms illustrate high-speed response of typical G-R Automatic Voltage Regulator. Illustrated at top, is sudden 1% change in 60-cycle voltage input to Regulator. Bottom oscillogram shows instrument correcting for this change in 8 cycles (0.13 seconds)

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